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Gomez-Sorzano, Gustavo
Reuters, Lipper U.S

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DEVELOPING THE CONCEPT OF SUSTAINABLE PEACE USING ECONOMETRICS AND SCENARIOS GRANTING SUSTAINABLE PEACE IN COLOMBIA BY YEAR 2019

*By Gustavo Alejandro Gómez-Sorzano**

Abstract

This paper belongs to my research program on violence and terrorism started in 1993, as a consequence of the growing concern regarding the increase in Colombian violence, and especially for its escalation during the 1990's. After 14 years of research, particularly after developing *a model of cyclical terrorist murder in Colombia 1950-2004, forecasts 2005-2019* (Gómez-Sorzano 2005, http://mpra.ub.uni-muenchen.de/134/01/MPRA_paper_134.pdf), *the econometrics of violence, terrorism, and scenarios for peace in Colombia from 1950 to 2019* (Gómez-Sorzano 2006, http://mpra.ub.uni-muenchen.de/539/01/MPRA_paper_539.pdf), and *Scenarios for Sustainable Peace in Colombia by year 2019* (Gómez-Sorzano 2006B, http://mpra.ub.uni-muenchen.de/135/01/MPRA_paper_135.pdf), I claim in this paper that I have formally developed the concept of *Sustainable Peace* using advanced econometrics. The concept of Sustainable Peace is thus presented to the international academic community, and is based in the construction of a structural econometric model for National murder, and a model for cyclical terrorist murder that have been simultaneously used for designing Scenarios granting Sustainable Peace in Colombia by year 2019.

Keywords: sustainable peace; scenarios for sustainable peace; scenarios granting sustainable peace; a model of cyclical terrorist murder in Colombia 1950-2004. Forecasts 2005-2019; democratic security policy; using the Beveridge and Nelson decomposition of economic time series for pointing out the occurrence of terrorist attacks; the econometrics of violence, terrorism and scenarios for peace in Colombia from 1950 to 2019; scenarios for sustainable peace in Colombia by year 2019.

JEL classification codes: C22, C50, C53, D63, D74, D78, H42, H56, K42, N46, O54.

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Econometrician, Reuters, Lipper. Gustavo.gomez-sorzano@reuters.com,
alexgosorzano@yahoo.com. PO BOX 976 DENVER, CO 80201
The opinions expressed do not compromise the company for which I currently work.

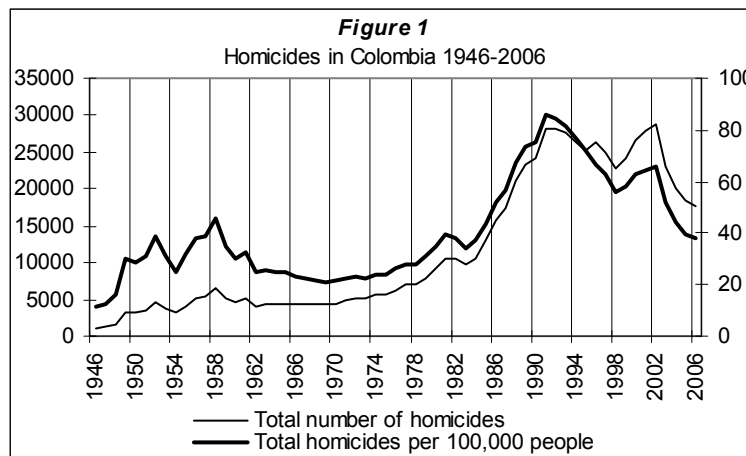
DEVELOPING THE CONCEPT OF SUSTAINABLE PEACE USING ECONOMETRICS AND SCENARIOS GRANTING SUSTAINABLE PEACE IN COLOMBIA BY YEAR 2019

Introduction

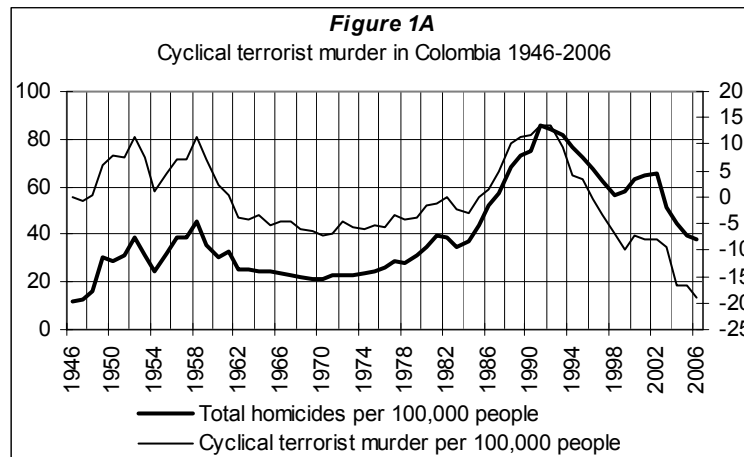
After creating a model for cyclical terrorist murder (Gómez-Sorzano 2005), and the Econometrics of violence, terrorism and scenarios for peace in Colombia from 1950 to 2019 (Gómez-Sorzano 2006), this paper continues that methodology research applied to the case of creating a structural model for murder, and re-estimating the model for terrorist murder for Colombia, designing scenarios granting sustainable peace by year 2019., i.e., scenarios 11 and 11A.

The current exercise takes advantage of the fact that from 1993 to 2006 the per capita series of murder for Colombia decreases continually turning this data series as stationary, a fact permitting for first time to estimate a structural model for the raw per capita murder series of Colombia, using the same theoretical predictors used in the model for cyclical terrorist murder (Gómez-Sorzano 2005). The main purpose of this paper is to formulate the concept of *Sustainable Peace* in order to help the Colombian National Planning Department (DNP) with the design of a State policy drawing the lineaments reaching sustainable peace by year 2019.

According to Colombian National Police statistics, homicides increased from around 5,000 per year in the 1950s, and 1960s to about 10,000 per year by 1980, and 30,000 per year in the early 1990s. During the last years however, this tendency has changed. Now murder declines abruptly from 28,781 in 2002 (around 66 murders per 100,000 people) to 22,973 in 2003 (52 murders per capita), 20,133 in 2004 (44.4 per capita), 18,363 in 2005 (40 per capita), and 17,672 in 2006(38 per capita– Figure 1).



A further reduction emerges when analyzing cyclical terrorist murder per capita figures¹ of -8.11 (2002), -9.6 (2003), -16.76 (2004), -16.79 (2005), and -18.77 (2006)² for those years respectively (figure 1A) suggesting both that terrorist murder is being eradicated, and that Colombia's civil conflict is dying. I claim that after 14 years of research I have found a way to construct two theoretically, and statistically good models, for cyclical terrorist murder, and for murder per-capita than can be applied to other countries infected by terrorism. The term cyclical terrorist component of murder or Cyclical murder should be interpreted as an index created after splitting the original per capita murder series from 1946 to 1999, or from 1946 to 2003 when still that series was not stationary. Enlarging the sample from 1946 to 2006 and testing for unit roots, proves that the dying civil conflict is turning the series stationary technically allowing to use as dependent variable the raw series of per-capita homicides.



In the present exercise both dependent variables shown on figure 1A: the cyclical terrorist murder and attacks index, and the original raw series of per capita murder are used independently with the same set of predictors to construct scenarios granting sustainable peace for Colombia by year 2019.

Data and methods

Data were collected in Colombia from various Colombia sources and adjusted for inflation and population growth (see data source appendix for a detailed description). The estimation method used is linear multiple regression.

¹ The re-estimation of the cyclical terrorist murder per 100,000 people is presented in the section for data and methods.

² There are no negative murders. Negative murders in this case represent homicides falling below the trend line as a consequence of an agonizing civil conflict. The cyclical terrorist component of murder or Cyclical murder should be interpreted as an index created after splitting the per capita murder series from 1946 to 1999, when still that series was not stationary. In the present paper it is the stationarity of per capita homicides what is allowing me to construct a model for the original raw series of homicides.

Decomposition of Colombian murder into permanent and transitory components³

Beveridge and Nelson decomposition

I use the augmented Dickey Fuller (1981), test to verify the existence of a unit root on the logarithm of the time series of murder 1946-2006. It presents the structural form shown in equation (1).

$$\Delta L \text{hom}_t = \alpha + \theta \cdot t + \phi L \text{hom}_{t-1} + \sum_{i=1}^k \gamma_i \Delta L \text{hom}_{t-i} + \varepsilon_t \quad (1)$$

The existence of a unit root, is given by $(\phi) \phi=0$. I use the methodology by Campbell and Perron (1991) in which an auto-regression process of order k is previously selected in order to capture possible seasonality of the series, and lags are eliminated sequentially if: a) after estimating a regression the last lag does not turn out to be significant, or b) if the residuals pass a white noise test at the 0.05 significance level. The results are reported on Table 2.

Table 2 Dickey & Fuller test for Unit Roots

Series	K	Alpha	Theta	Phi	Stationary
D(Lthompc) – murder series	9	0.5937	0.0047	-0.2151	Yes
Colombia , 1946-2006		(3.85)	(3.26)	(-3.97)	
Notes: 1. K is the chosen lag length. T-tests in parentheses refer To the null hypothesis that a coefficient is equal to zero. Under the null of non-stationarity, it is necessary to use the Dickey- Fuller critical value that at the 0.05 level, for the t-statistic is -3.50 , -3.45 (sample size of 50 and 100)					

After accepting the null for a unit root (accepting the series is stationary), I technically can not perform the BN decomposition which begins by fitting the logarithm of the per capita murder series to an ARIMA model of the form (2). The BN decomposition however is performed, being able to split the per-capita murder series getting the cyclical component of murder or terrorist murder. Table 6 presents the Arima model selected where its constant appears as not statistically significant for the fact the series is stationary; the cyclical component of murder or cyclical terrorist and attacks index obtained is used ahead in the paper for re-estimating the model of cyclical terrorist murder:

$$\Delta L t \text{hom}_t = \mu + \sum_{i=1}^k \gamma_i \Delta L t \text{hom}_{t-i} + \sum_{i=1}^h \psi_i \varepsilon_{t-i} + \varepsilon_t \quad (2)$$

Where k, and h are respectively the autoregressive and moving average components. The selection of the ARIMA model is computationally intense. My search for the right model stopped

³ The technical reason for decomposing murder to create and estimate a model for cyclical terrorist murder stems in the fact that the series rejects the existence of a unit root. Enlarging the sample from 1946 to 2006 turns the original murder series stationary allowing the construction of a model using the original per capita murder series.

with an ARIMA (0,1,13) ran with RATS 4, and shown below on tables 3,4,5, and 6 (samples 1946-2002, 1946-2003, 1946-2004, and 1946-2006 respectively), including a moving average structure of order 1,5, and 13⁴, and no autoregressive structure, the model is unique at providing a cyclical component oscillating around a zero average, and coinciding amazingly well with mayor cycles of violence, and guerrilla terrorist attacks and clashes occurred in Colombia from 1946 to 2006. It is important to note that tables 3,4,5,6, show the fact that as the Colombia civil conflict is agonizing and so, murder decreasing the model estimated and shown has turned out its constant, or intercept statistically insignificant, as well as the series of murder stationary.

Table 3. Estimated ARIMA model for murder per capita for Colombia

Annual data from 1946 to 2002

Variables	Coeff	T-stats	Std Error	Signif
Constant	0.0300	2.44	0.0120	0.1772
MA(1)	0.2376	1.97	0.1204	0.0530
MA(5)	-0.3318	-2.67	0.1242	0.0100
MA(13)	-0.3365	-2.55	0.1316	0.0130

Centered R² = 0.92

DW= 2.07

Significance level of Q = 0.5758

Usable observations = 56

Table 4. Estimated ARIMA model for murder per capita for Colombia

Annual data from 1946 to 2003

Variables	Coeff	T-stats	Std Error	Signif
Constant	0.0250	1.72	0.0140	0.0890
MA(1)	0.2747	2.14	0.1281	0.0360
MA(5)	-0.2863	-2.18	0.1312	0.0330
MA(13)	-0.2929	-2.14	0.1363	0.0360

Centered R² = 0.91

DW= 2.01

Significance level of Q = 0.5881

Usable observations = 57

Table 5. Estimated ARIMA model for murder per capita for Colombia

Annual data from 1946 to 2004

Variables	Coeff	T-stats	Std Error	Signif
Constant	0.0250	1.7392	0.0144	0.0870
MA(1)	0.2789	2.27	0.1224	0.0260
MA(5)	-0.2898	-2.24	0.1290	0.0280
MA(13)	-0.2994	-2.27	0.1315	0.0260

Centered R² = 0.91

DW= 2.09

Significance level of Q = 0.5587

Usable observations = 58

⁴ The same autoregressive structure used in a Model of Cyclical Terrorist Murder in Colombia http://mpr.ub.uni-muenchen.de/134/01/MPRA_paper_134.pdf, and the Econometrics of Violence, Terrorism and Scenarios for Peace in Colombia from 1950 to 2019 online at http://mpr.ub.uni-muenchen.de/539/01/MPRA_paper_539.pdf.

Table 6. Estimated ARIMA model for murder per capita for Colombia

Annual data from 1946 to 2006

Variables	Coeff	T-stats	Std Error	Signif
Constant	0.0220	1.5217	0.0146	0.1336
MA(1)	0.2729	2.24	0.1215	0.0280
MA(5)	-0.2701	-2.07	0.1301	0.0420
MA(13)	-0.2744	-2.09	0.1307	0.0400

Centered $R^2 = 0.91$

DW= 2.05

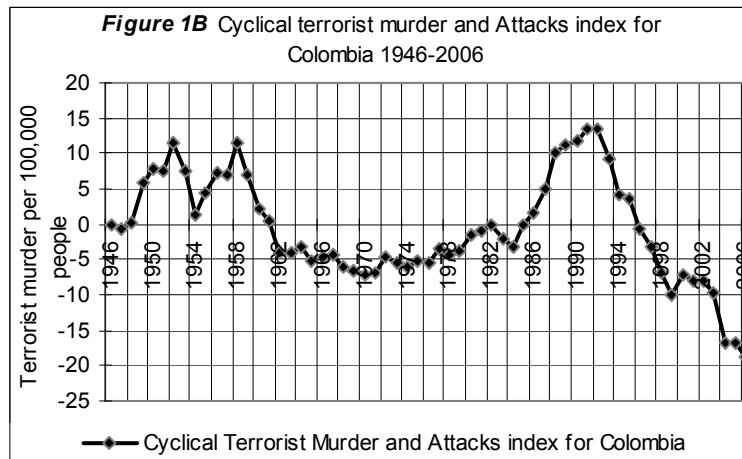
Significance level of Q = 0.5527

Usable observations = 60

The four model parameters from table 6 are replaced in the equation for the permanent component of murder shown in (3)⁵:

$$L \text{ hom}_t^{PC} = L \text{ hom}_0 + \frac{\mu \cdot t}{1 - \gamma_1 - \dots - \gamma_k} + \frac{1 + \Psi_1 + \dots + \Psi_h}{1 - \gamma_1 - \dots - \gamma_k} \sum_{i=1}^t \varepsilon_i \quad (3)$$

The transitory or cyclical terrorist murder estimate is found by means of the difference between the original series, and the exponential of the permanent per capita component ($L \text{ hom}_t^{PC}$)⁶, and is shown on Figure 1B below. The estimated cyclical index matches qualitative description of known waves of organized crime, internal tensions, crime legislation, political unrest as well as government guerrilla clashes and paramilitary guerrilla clashes, and disentangles the timing for terrorist attacks, and terrorist murder in Colombia. To compare this historical narrative of events with my estimates for cyclical terrorist murder, and attacks I use chronologies, and description of facts taken from Bushnell (1993) and Valencia (1997).



⁵ The extraction of permanent and cyclical components from the original series is theoretically shown in BN (1981), Cuddington and Winters (1987), Miller (1998), Newbold (1990), and Cárdenas (1991). I show the mathematical details for Colombia in appendix A.

Eq.3 above, turns out to be Eq.17 in appendix A.

⁶ Turning the estimated permanent per capita component into the level of the permanent component.

Historical adjustment of the estimated cyclical component of murder or “Cyclical terrorist murder and attacks index”, with major political events, government guerrilla, and guerrilla paramilitary clashes in the country form 1946 to 2006

The Liberal party was in power for 16 consecutive years from 1930 to 1946, and this period was called the *Liberal Republic*. Although the country historically has had one of the longest electoral traditions in the continent and the world (Uribe Vélez, 2005, p. 16)⁷ and in spite that at that time the Colombian two party system, was superficially taken as evidence of the country's political stability, it was a handy way of keeping alive old grudges and passing them from father to son to grandson. This caused a rising cycle of violence just in time for the presidential elections of 1946 (figure 1B). This year begins a struggle for bureaucratic positions, the winners in elections wish to dominate all the positions, while the losers fight hard not to lose them; in 1948 *Gaitán*, a charismatic liberal leader is assassinated starting what was called *The Bogotazo*, defined as an outburst of mass rioting in Bogotá and all over the country (cyclical terrorist murder per capita passes from 0.25 in 1948 to 5.88 in 1949, 7.74 in 1950, 7.57 in 1951, and to 11.38 in 1952).

Gaitán was disliked by most of the liberal party establishment. His assassination caused that the army became tainted by politics and so, in a battle in 1952 at the peak of the cyclical component (figure 1B) they left an estimated of 1,500 people dead in El Líbano, State of Tolima.

In 1953 the country had a second military government. General Gustavo Rojas Pinilla becomes president (cyclical terrorist murder reduces to 7.51 in 1953, and 1.19 in 1954). During his regime thousands of guerrillas surrendered their weapons from 1953 to 1954 and that led to this declining cycle⁸.

Then from 1958 to 1974 the country had the system of presidential alternation in power called the *National Front*, this was a new era of political reconciliation and domestic peace the institutionalization of a bipartisan rule put an end to the electoral competition (decreasing cycle, figure 1B). It is in this period, (specifically years 1963-1965-1967 and 1970) that guerrilla groups appeared: in 1963 the *Revolutionary armed Forces of Colombia* (FARC) is born, in 1965 the *National Liberation Army* (ELN), in 1967 the *Popular Liberation Army* (EPL), and in 1970 the *M-19 Group*.

The M-19 Group's life was ephemeral. In 1979 they stole 5,000 weapons from an army canton in the north of Bogotá. Later in 1980 they used them for taking over the Dominican Republic's Embassy in Bogotá in the midst of a diplomatic reception and holding hostage 14 ambassadors including the U.S envoy.

From 1982 to 1986 the country experienced a *first peace process* (cyclical terrorist murder accordingly decreases to 0.03 per capita in 1982, -2.12 in 1983, -3.16 in 1984, -0.17 in 1985, and jumps to 1.55, after the pact broke up). There were intensive efforts by the government during this period to reach cease fire agreements with guerrilla groups, excepting the ELN, resulting in a decreasing cycle as shown in figure 1B. However, in these agreements substantial items were not clearly resolved, particularly regarding demobilization, and surrendering of

⁷ This paper is a presidential address to the Colombians in regards to the social and economic improvements that the country must reach by year 2019.

⁸ The time period 1947-60 is generally referred to as *La Violencia*, defined as a period of intense power clashes between the Liberal and Conservative parties mingled with a Roja's military intervention 1953-57. A paradoxical phenomenon of these years was a surge of economic growth, homicides were going up but so was the GDP, at a rate of five percent annually from 1945-1955. Industrial output showed even sharper growth at a yearly rate of nine percent.

weapons; the agreements generated positive advantages for the groups, by paralyzing military operations, and leaving large empty geographical gaps that were occupied by new guerrilla cells.

In 1984 the Justice Minister increased pressure on the drug industry causing the destruction of the largest clandestine laboratory being later assassinated by the Medellín Cartel. Later in 1985 and, during peace talks the M-19 Group seized the Justice Palace, seat of the Supreme Court, holding as hostage magistrates that by the end of the night were assassinated⁹. The assault to the Justice Palace was the final blow to the frustrated peace process and so, from 1986 to 1991 cyclical terrorist murder takes the form of a general conflict, made up of the confrontation between the government, drug traffickers and guerrillas, which caused hundreds of deaths in the Communist Party (Unión Patriótica), and the assassination of the Attorney General and three presidential candidates (Bernardo Jaramillo, Luis Carlos Galán and Carlos Pizarro). My estimates for cyclical terrorist murder pass from 5.03 in 1987 to 10.23 in 1988, 11.34 in 1989, getting its highest historical point in 1991 with 13.53 per capita.

In 1990, Liberal César Gaviria is elected president starting a process of constitutional reform. He changed the Constitution and the policy toward drugs traffickers, he rejected extradition as a mean of countering the drug traffic and unveiled a program for dealing with the drug problem that produced concrete results: any trafficker that voluntarily surrender to Colombian authorities and plead guilty to one or more charges would not be extradited to the U.S. but instead tried in Colombia. The Medellín Cartel organization declared a truce, and Pablo Escobar gave himself up in 1992. Figure 1B captures this declining cycle with 13.45 per capita.

In 1993, as the U.S. presses for his extradition, Escobar escaped prison launching another terrorist campaign, but was killed by Los Pepes a group belonging to the Cali Cartel.

In 1994, Liberal Ernesto Samper is elected president and Colombia is decertified by Washington for the alleged involvement of drug money in the electoral campaign. A new actor in the conflict appeared this year; a Federation of Paramilitary groups led by Carlos Castaño, and called Self Defense Units of Colombia (AUC). As a consequence of this, murder and displacement of civilians from the countryside increases sharply. Cyclical terrorist murder begins its abrupt descent in 1996.

In 1998, Conservative Andrés Pastrana is elected president starting a second *Peace Process*, and an ambitious plan to establish a negotiated peace without a cease fire agreement. Pastrana's government gave a demilitarized zone (DMZ) the size of Switzerland to the FARC, and restricted the presence of the army and the police within such zones. Cyclical murder continues descending. Pastrana's government started an ambitious modernization plan for the Army (Figure 1B).

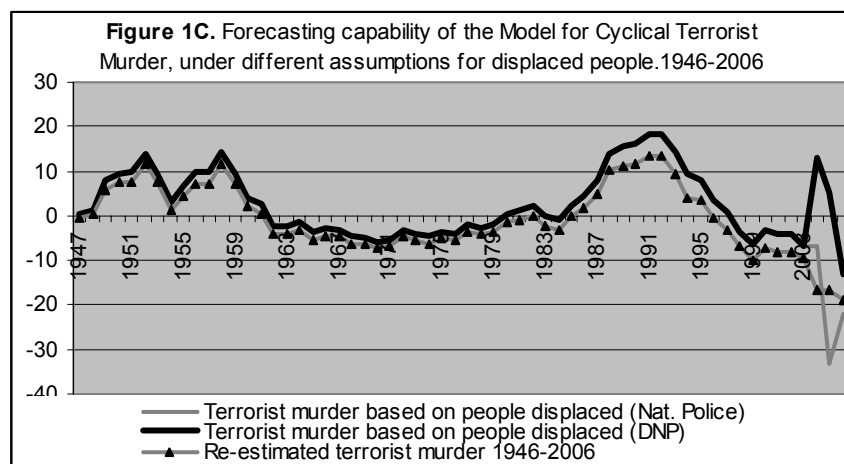
In 2002, independent Liberal Alvaro Uribe Vélez is elected president, enacting a strong policy to confront guerrillas and paramilitary, his *Democratic Security Policy* proves effective at diminishing the intensity of the conflict; the country lowers total and transitory murder per capita.

As the estimated component coincides with the historical political narrative I have called it *Cyclical Terrorist Murder and Attacks index*, and began the construction of a Structural National model for murder, and a model for cyclical terrorist murder, that can be adapted to other countries suffering terrorism.

⁹ There was intensive fire between the groups and the military who used tanks to get into the Palace. At the end of the night The Palace was completely destroyed and burned out.

Forecasting capability of the model for cyclical terrorist murder

Figure 1C below, shows the forecasting capability of the model for cyclical terrorist murder. Both forecasted series are highly sensible to the number of displaced people feeding up the model for forecasting purposes¹⁰. The black line jumps abruptly since its based on displacement by the DNP that decreases from 2003 to 2004 from 212,000 to 117,000 people, and so terrorist murder jumped to 12.9 in 2004; while the gray line shows forecasted terrorist murder based on displaced by national police that jumps from 541,000 to 641,000 to 1,027,000 people from 2003 to 2004 and 2005, and so terrorist murder decreased abruptly from 6.9 in 2003 to 6.93 in 2004 and to -33.32 in 2005. For 2006 both forecasted series converge closely to the re-estimated terrorist murder shown on this paper.



Designing a structural National model for murder, and a model for Cyclical Terrorist Murder

Initial model

Experience has taught me that complicated time series must be modeled with a combination of trending, and cyclical predictors. The present case of constructing, and estimating a Structural National model for murder in Colombia, and a model for Cyclical terrorist murder belongs to this category. Both models are so, assembled using a highly interesting combination of political, effective, economic, and social variables allowing me to formulate the concept of *Sustainable Peace*, and constructing scenarios for Colombia granting peace by year 2019. The theoretical basis of these model were developed in Gómez-Sorzano (2005, and 2006A).

¹⁰ This forecasts were realized in the Econometrics of Violence, Terrorism, and Scenarios for Peace in Colombia from 1950 to 2006. http://mpra.ub.uni-muenchen.de/539/01/MPRA_paper_539.pdf

Political variables

Cyclical terrorist murder might be thought of as a “combined mixture” of politically motivated violence and guerrilla activity. In Colombia, the time-period from 1946 to 1957 (or in Bushnell’s, 1993, discussion from 1947 to 1960) is generally referred to as *La Violencia*, a period of intense power clashes between the “liberal” and “conservative” parties, mingled with a brief, over military intervention (1954-1958) and incipient guerrilla activity. But from 1958 to 1978, the two main establishment parties came to a peace of sort and, under the name of National Front, arrived at a power-sharing agreement according to which the presidency would be swapped between the parties every four years, and – within each four-year term – cabinet and other high-ranking political posts would be divided up as well. During those years, political murder fell, even as guerrilla activity continued and intensified. After 1978, the power sharing arrangement broke down. Intense struggles and political dominance reemerged, now intensified by cocaine riches. The latter brought drug cartels into the political struggle as well, as drug-lords sought control over land to grow coca leaves. This, in turn, appears to have drawn owners of large-scale land-holdings into the conflict and various para-military groups emerged to participate in the struggle.¹¹¹²

A model explaining cyclical terrorist murder then should contain variables for the *La Violencia* (a time period characterized by intense clashes between traditional political parties) and *National Front* years (the time period where the peasant self-defense movements or communist guerrilla appears). This is done in the simplest and most effective way with the use of dummy variables. Following Gómez-Sorzano (2005 and 2006A), I code *La Violencia* equal to 1 for 1947 to 1960, and call the variable “B” (for *Bogotazo*, which refers to the violent, murderous rioting in Bogotá and the whole country on April 9 1948). The National Front years (“CL” – conservative/liberal) are coded equal to 1 to 1958 to 1978.

Effective variables – armed forces

Whereas I do have numbers on the strength of the police and armed (i.e., military) forces, I am not in possession of large series for para-military, guerrillas, and drug-gangs.¹³ It might be argued, however, that the police and military personnel numbers reflect information about the strength and intensity of the various opposing forces so that, from a modeling perspective, the police and military forces could stand as a proxy for all armed groups in the country.

¹¹ . On the role and links between and among police, army, and para-military troops in the Colombian conflict see, e.g., Giraldo (1996).

¹² . The information in this paragraph is uncontroversial. For a history of Colombia see, e.g., Bushnell (1993).

¹³ . Following reports in The Wall Street Journal and The Economist, numbers for 2002 run about 22,000 members for FARC and ELN, the two largest rebel groups, perhaps 10,000 to 12,000 para-military troops, and another 5,000 or so drug-related troops. The Colombian armed forces weigh in about 150,000 (including 50,000 salaried, professional troops) and the police force at 100,000.

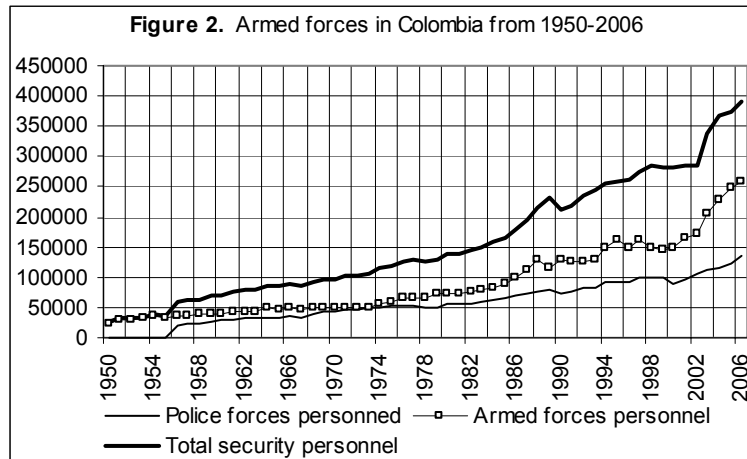


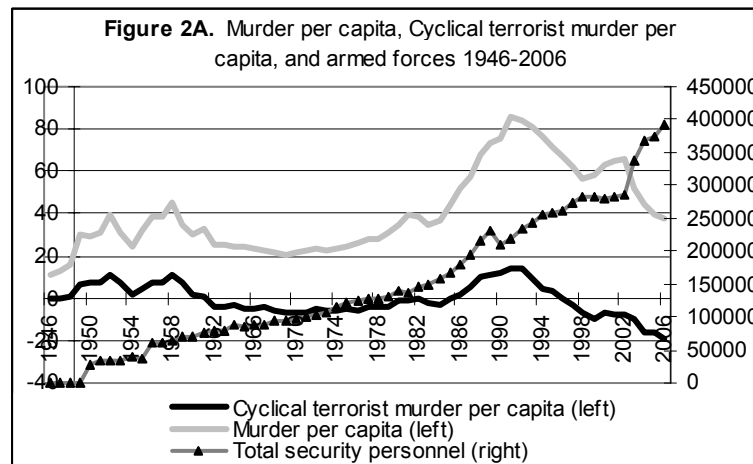
Figure 2 does show a constant level of armed forces during the National Front years, 1958 to 1978 and an ascending one for police forces. Thereafter, I note a drastic force increase, lasting, especially from 1983 to 1990. This was the time when cocaine became so profitable as to spur competition for control over land and corresponding political influence. This mingling of old and new economic interests and political control, in which established political parties, the police and military, the drug-lords, and landowners and paramilitary participated, lasted, roughly, from 1978 to 1989 with a minor stop in the pace of violence from 1990 to 1991, when respectively the M-19 guerrilla movement agreed to a cease-fire in order to create the political party Democratic Alliance M-19 and when Colombia adopted a new Constitution. The post-1991 period was politically calm but shows a growing level of security forces because of the continued conflict among the drug cartels and later on during president Pastrana's government (1998-2002), between the paramilitaries and drug traffickers¹⁴. Bushnell (1993) is explicit in referring to the post-1991 era as the "end of war" period.

Although after examining figure 2, it does appear as if police and armed forces strength respond to different underlying motivations. In particular, note that during the National Front years, the armed force variables remains relatively stable, picking up in 1979 (7.6%) a year later after the National Front consensus broke apart, and increases drastically during the 1980s. The police force variable moves quite differently, decreasing in 1979 (-4.8%)¹⁵. Since both variables respond to different motives, a priori, the movement of the total security personnel (police + army = Taf_{99}) is more closely associated with the historical series of National murder, and cyclical terrorist homicide observed in Colombia during 1950–2006 (figure 2A) because it also responds to different motives (political, economical and social motives) and it is this variable therefore what I will use in my model. It also has the advantage of reaching back to 1950, giving me additional degrees of freedom. In fact, the sharp rise in this variable in the early fifties is entirely consistent with the initial *La Violencia* years, increasing under the military General Rojas Pinilla (1953-1957). A different way to characterize the post-1978 period might be with the further use

¹⁴. E.g., In 1993 Pablo Escobar escapes from prison launching a terrorist campaign as a the debate over extradition is pressed in Colombia by the U.S; also a new group, "Los Pepes," (victims of Pablo Escobar), emerges, connected to the Cali Cartel, Los Pepes carried out acts of terrorism against Escobar's organization and collaborated with the security forces in the search of Escobar up to his death by December this year. (NACLA, Report on the Americas Vol 35, No.1 pp 24-27)

¹⁵. The different movement of both series would be suggesting that in times of political clashes police forces increase while armed forces diminish; in similar way in times of guerrilla – drug traffickers and paramilitaries activities the armed forces increase while the police forces diminishes.

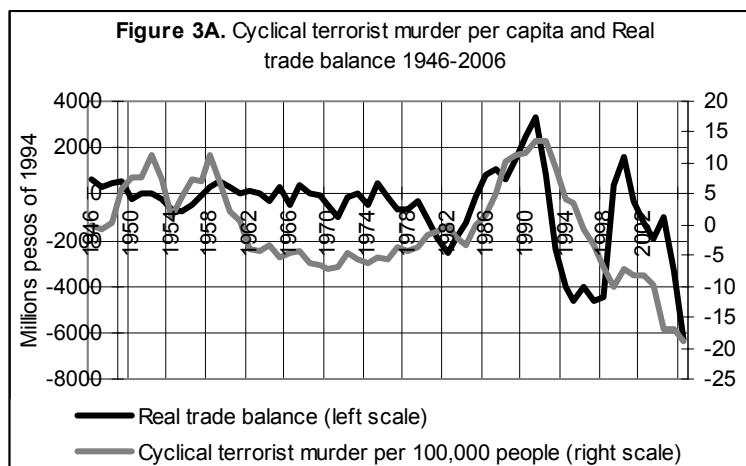
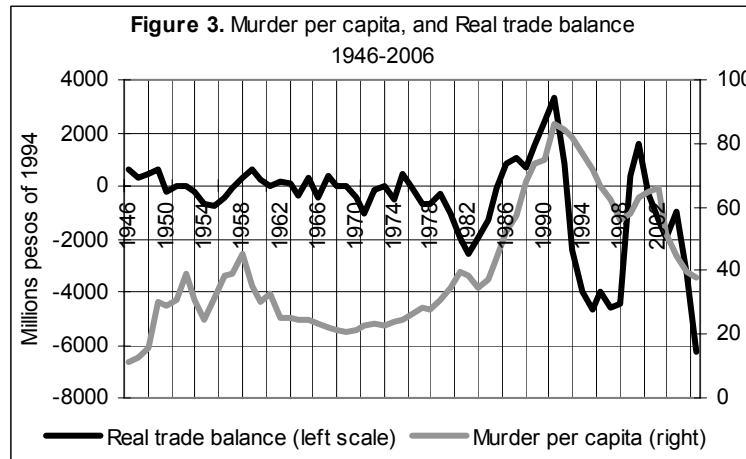
of dummy variables such as “all-out-war” (1979-1991) and “end-of-war” (post-1991) but the use of a continuous, relevant variable such as *Taf1* that stretches across almost the entire time-period (1950-2006) is statistically preferred.



Economic variables

The Colombian literature has noted a seemingly curious link between commodity-export booms and political violence, i.e., between economic well-being and increases in murder. Recent evidence finds for the seven biggest cities and their MSA's a strong relation between criminality and narco-traffic income (Sánchez, F and J. Núñez, 2000). One hypothesis is that commodity booms increase the pot-of-gold over which it is “worth fighting”¹⁶. One might therefore speculate and test the hypothesis that, for Colombia, movements in the inflation-adjusted trade balance (*Rtb99*) is an explanatory variable for National, and cyclically motivated terrorist murder. An inspection of the descriptive graph (in figure 3) is suggestive. There are four time-periods of improvements in the balance of trade: 1955-1959; 1971-1975; 1982-1991; and 1997-2001 – figures 3, and 3A. Levels of cyclical violence in all of them are strongly directly associated with trade balance improvements and for this reason I am including this variable in my final model.

¹⁶. We know from the African experience that natural-resource riches may exert powerful effects to attract contestants (see Sambanis, 2002, for a literature review on this and other aspects of the economics of civil wars).

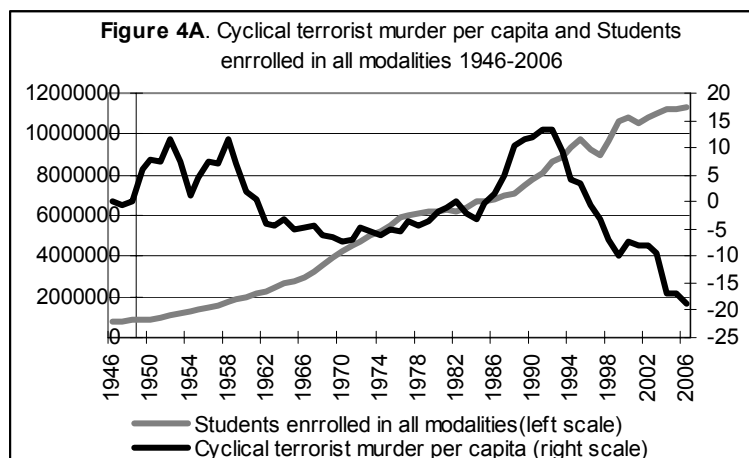
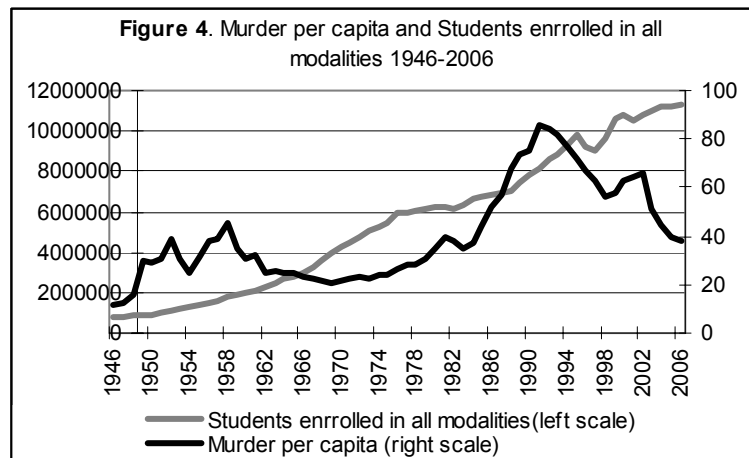


Social variables

As Jimeno (2001) cites there is a growing line of thought in Colombia that views violence as a non-specific, all-pervasive, non-historical phenomenon – the very essence of evil in Colombian society. This tendency runs parallel to the reasoning of those who view violence as an endemic disease of the Colombian social structure, the product of its social inequalities. General Alvaro Valencia Tovar (1997) considers violence as a continuous chain of violences, possibly having remote origin in the acts of the Spaniard conquest, during those times inequality was essentially the product of clashes between the Spaniards invaders and the native rebellious Comuneros captains. I therefore include in this model a historical social inequality variable using as a proxy for it *education* measured by the number of students matriculated in all modalities in Colombia (pre-elementary, elementary and high school)¹⁷. My expected coefficient between enrollment and

¹⁷ . The National Demography and Health Care Survey (Profamilia, 1995) examined domestic violence in relation to the level of schooling and the number of children, both for spouse and child abuse, and found that the lower the level of education and the greater the number of children in the family, the greater the likelihood of domestic violence. (See Violence and Social Life in Colombia in Critique of Anthropology Vol. 21, No. 3 (2001) pp. 221-246)

cyclical terrorist murder is negative. Figures 4 and 4A present the historical movement of students enrolled in all modalities versus National murder and cyclical terrorist murder



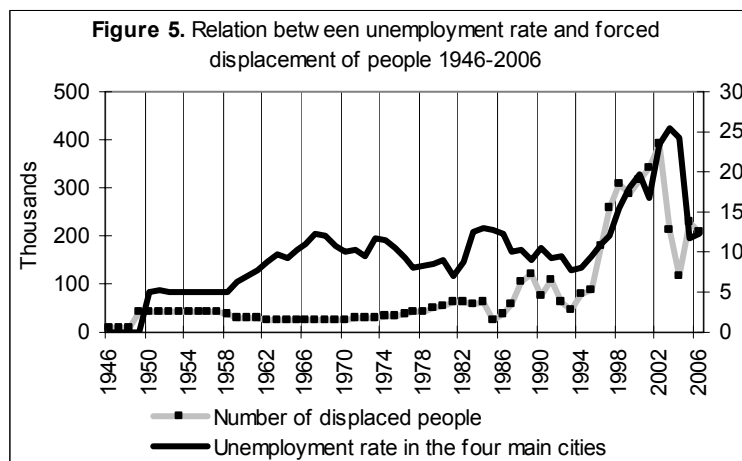
Forced displacement of people and the unemployment rate

The problem of internal displaced people in Colombia is one of the greatest facing the country today¹⁸. Nowadays, there are more than a million people affected by it and, this number is increasing daily as a consequence of the internal war. In general terms these people lose everything, abandoning their homes and possessions, keeping themselves in permanent danger because of retaliation or the possibility that a new surge of cyclical terrorist murder force them to move again. The Law 387 of 1997 defines *displaced people* as, “any person that has been forced to migrate inside the national territory, abandoning its quality shelter and its permanent economic activities because, his life, physical integrity, security and personal freedom have been wounded, or because they are directly threatened as a consequence of the internal war, disturbances and

¹⁸ . Revista Criminalidad, Policía Nacional de Colombia, 2002.

internal tensions, massive violations of the human rights and transgressions to the international humanitarian law”.

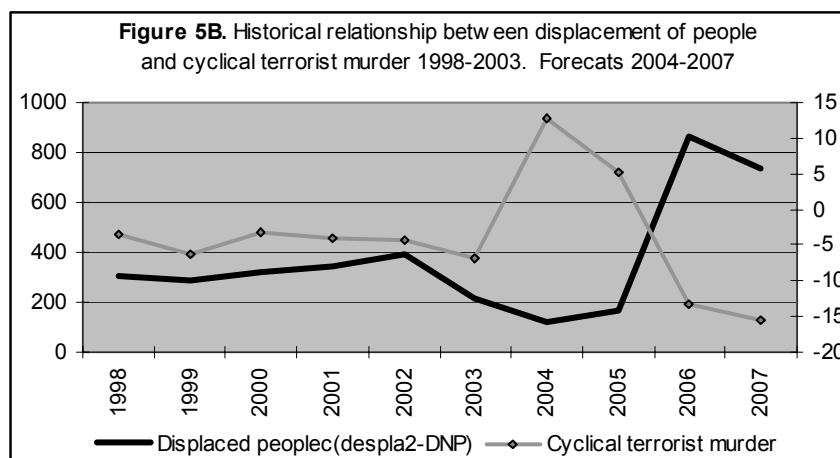
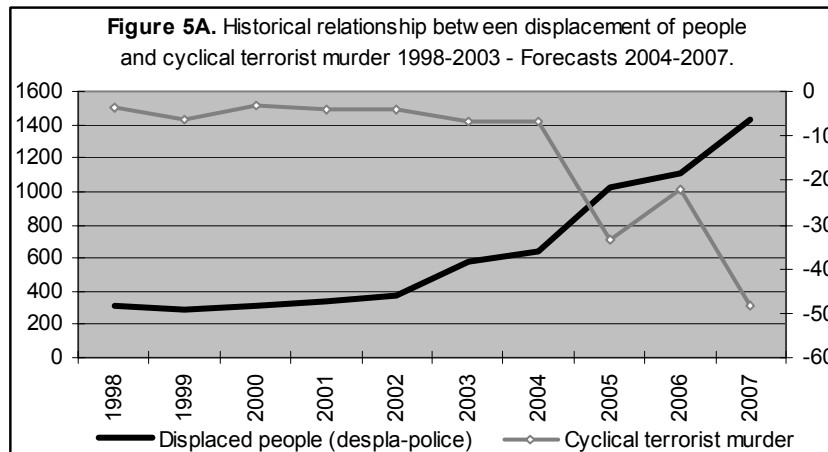
The Colombian Police has identified a total of five main causes generating displaced people: clashes between illegal armed groups disputing the possession of the territory in certain areas of the country. Normally these confrontations occur in strategic drug producing areas of the country or close to the international frontiers between Colombia and the neighboring countries since these borders favor the international drug trafficking; second, selective homicides accompanied by threatens and pressure forcing people to leave, splitting their families; third, massacres in which the delinquents deliberately killed peasants accusing them of being informants to guerrillas groups, to self defense groups or to the army; fourth, fumigations to coca crops affecting also basic plantations for human consumption and, fifth, the breaking of peace talks between the government or the guerrillas and paramilitary organizations (figure 5 shows the almost perfect statistical relationship between displacement of people and the unemployment rate).



In regards to the consequences of displaced people, the Colombian Police also mentions, family splitting; political, social and cultural ruptures of the population, migration and most importantly the increase in the unemployment rate. It is for this reason that I have included the number of displaced people along with the unemployment rate in the four main cities of the country as predictors for cyclical terrorist violence. The logic is that displaced people coming to the four main cities is the result of clashes in cyclical terrorist murder in the countryside (so I expect a negative correlation between cyclical terrorist murder, and forced displaced people); these new migrants to the cities in turn boost the unemployment rate¹⁹ reducing the social pressure and killing in the countryside (so I expect to find a negative relation between the unemployment rate and cyclical terrorist murder in the countryside. Figures 5A and 5B²⁰.

¹⁹ The unemployment rate for 2003 is assumed to be $23.2\% + 2.1\% = 25.4\%$. The 2.1% is the total growth in informal employment (April to June) from 2002 to 2003.

²⁰ Figures assembled with information taken from *The Econometrics of Violence, Terrorism and Scenarios for Peace in Colombia from 1950 to 2019*, pp. 26, figure 10 producing forecasts for terrorist murder shown on figure 10B. Despla-police from figure 5A, and Despla2-DNP from figure 5B, are used for creating the forecasts shown in these graphs and as well presented in figure 10B http://mpra.ub.uni-muenchen.de/539/01/MPRA_paper_539.pdf



One more time figure 5 shows the direct relationship particularly starting in the 1990's between displaced families for innovations in cyclical terrorist murder in the countryside and its output or consequence, the increase in the unemployment rate²¹. For these reasons both variables are selected for inclusion.

Results and interpretation

My models to be tested this are (with expected signs preceding the variable):

A STRUCTURAL NATIONAL MODEL FOR MURDER IN COLOMBIA

²¹ . The theoretical reasons for this relationship are explained in Revista Criminalidad, Policía Nacional de Colombia #45, 2002 pp 86-91. It contains a description of the phenomenon of displaced people, generalities, legal background, causes generating displaced people, consequences of having these people displaced, and forms of displacement.

$$Thompc_t = F(+Cons tan t, +B_t, -CL1_t, +Rtb9_t, +Taff99_t, -U9_t, -Students9_t, -Despla99_t)$$

Where

Thompc	Murder per 100,000 people for Colombia
B	Years of <i>La Violencia</i> (1947-1960, following Bushnell's dating)
CL1	Years of National Front (1958-1978) and (1994 to 2006) ²²
Rtb9	Real trade balance (millions of pesos of 1994)
Taf99	Total number of armed forces (police + army)
U9	Unemployment rate (four main cities)
Students9	Number of students matriculated in all modalities.
Despla99	number of displaced persons (source: Colombian Presidency)

A MODEL FOR CYCLICAL TERRORIS MURDER OR TERRORIST ATTACKS

$$CVPC1B_t = F(+Cons tan t, +B_t, -CL1_t, +Rtb9_t, +Taff99_t, -U9_t, -Students9_t, -Despla99_t)$$

Where

CVPC1B	Cyclical terrorist murder per 100,000 people for Colombia
B	Years of <i>La Violencia</i> (1947-1960, following Bushnell's dating)
CL1	Years of National Front (1958-1978) and (1994 to 2006)
Rtb9	Real trade balance (millions of pesos of 1994)
Taf99	Total number of armed forces (police + army)
U9	Unemployment rate (four main cities)
Students9	Number of students matriculated in all modalities.
Despla99	number of displaced persons (source: Colombian Presidency)

Tables 7 and 8, show the estimated results using RATS4

Table 7 – A STRUCTURAL NATIONAL MODEL FOR MURDER

Table 7. Estimated results - Annual data 1946 -2006				
Dependent variable Thompc				
Variables	Coefficient	T-stats	Std Error	Signif
CONSTANT	19.220000	5.521	3.48130	0.00000
B	9.030000	2.7999	3.22570	0.00710
CL1	-4.500000	-2.2259	2.02480	0.03029
RTB9	0.002400	4.3618	0.00055	0.00006
TAF99	0.000460	12.8485	0.00004	0.00000
U9	-1.962000	-6.8196	0.28770	0.00000
STUDENTS9	-0.000004	-3.3276	0.00000	0.00160
DESPLA99	-0.014480	-0.9458	0.01531	0.34850
Centered R ² = 0.9423				

²² As a curious remark Colombia has had alternation in power again from 1994 to 2006 (From 1994 to 1998 Liberal Samper was in power, from 1998 to 2002 Conservative Pastrana, and from 2002 to 2006, independent liberal Uribe)

DW= 1.71
Significance level of Q = 0.7992
Usable observations = 61

Table 8. A MODEL FOR CYCLICAL TERRORIST MURDER

Table 8. Estimated results -Annual data 1946 - 2006				
Dependent variable Cvpc1B				
Variables	Coefficient	T-stats	Std Error	Signif
B	7.674400	9.811	0.78220	0.000000
CL1	-3.126800	-3.6117	0.86570	0.000660
RTB9	0.001178	4.6049	0.00026	0.000025
TAF99	0.000157	10.1552	0.00002	0.000000
U9	-0.790834	-6.3956	0.12365	0.000000
STUDENTS9	-0.000002	-4.7773	0.00000	0.000014
DESPLA99	-0.034463	-5.7606	0.00598	0.000000
Centered R ² = 0.8442				
DW= 1.85				
Significance level of Q = 0.8732				
Usable observations = 61				

All coefficient estimates conform to my prior expectations. The *La violencia* dummy is positive and statistically significant; the National Front dummy is negative and statistically significant, proving the reason to regard the inherited partisan rivalry of Liberals and Conservatives as one of the most important causes of National murder, and cyclical terrorist murder.

As to the monetary variables, the trade balance effect is positive, as predicted, and is also statistically significant. The total number of armed forces variable is statistically significant and carries the expected positive sign. The unemployment variable shows the expected negative sign indicating the trade-off between the deceleration in murder, and cyclical terrorist murder in the countryside, and the increase in unemployment in the four main cities. The number of students matriculated carries the expected negative sign being statistically significant; in regard to displacement of people both models provide the expected negative sign indicating how people coming to the main cities diminish pressure in the countryside reducing terrorist murder, and National murder, but boosting the unemployment rate. Both models display a good adjusted R² of 0.94 (National model for murder), and 0.84 for the model for Cyclical terrorist murder and good Durbin-Watson indexes of 1.71 and 1.85 respectively.

THE CONCEPT OF SUSTAINABLE PEACE

Sustainable peace is a socio-economic, political-cultural, process consciously adopted by a democratic country, characterized by the decision to move towards equality, justice and human rights for all inhabitants of this geographical area, or country while breaking up the cycles of terrorist murder, and terrorist assaults, reducing total National murder indefinitely.

The movement towards equality, justice, and human rights is implemented when, a country, increases students enrolled in all modalities, reduces the unemployment rate, and grants security, allowing its urban and rural inhabitants to get permanent homes, or provisional lands preventing processes of forced displacement of people.

The concept was developed by me after 16 years of continued research, and concretely after designing *the model of cyclical terrorist murder in Colombia, 1950-2004. Forecasts 2005-2019* online at http://mpira.ub.uni-muenchen.de/134/01/MPRA_paper_134.pdf, applying it for designing *Scenarios granting sustainable peace in Colombia by year 2019*, online at http://mpira.ub.uni-muenchen.de/135/01/MPRA_paper_135.pdf.

The variables comprising this concept are carefully explained in *The Econometrics of Violence, Terrorism and Scenarios for Peace in Colombia from 1950 to 2019*, online at http://mpira.ub.uni-muenchen.de/539/01/MPRA_paper_539.pdf.

The concept of sustainable peace sustains itself through 4 main pillars: political, effective, social, and economic variables.

Political variables refer to the fact that alternation in power is essential in modern democracies for maintaining sustainable peace preventing the concentration of excessive power by a particular political party or person. Exception to this rule is the recent Colombia case where through Democratic elections, President Alvaro Uribe was re-elected and trusted to continue his Democratic Security Policy for a second period, and possibly for a third period.

Effective variables refer to the adequate total defense forces (army, navy, police officers), and defense infrastructure a country must have for protecting its territories against internal, and external attacks.

Economic variables represented by the real trade balance that keeps the internal economy in equilibrium allowing a country to start, and attain sustainable peace, both forces work together. Once a country has decided to start a process of sustainable peace based on the four pillars above mentioned, the process starts driving the real trade balance to equilibrium

The remaining social variables are composed by the triplet: students enrolled, unemployment rate, and forced displacement of people. Education measured by students enrolled in all modalities, and the reduction of the unemployment rate guarantee the right a country must grant all its citizens preventing them from finding their living through illicit activities, while the reduction of forced displacement of people is achieved through governmental policies granting security in the countryside, homes or lands work together providing population stability preventing forced displacement processes giving a sense of fulfillment of human rights.

Scenarios 11 and 11A appear as breaking the cycle of Terrorist murder in Colombia granting sustainable peace by year 2019 (Figures 38 and 89).

A STRUCTURAL MODEL FOR NATIONAL MURDER IN COLOMBIA, 1950 –2006 SCENARIOS GRANTING SUSTAINABLE PEACE BY YEAR 2019

Introduction

This first section presents 17 scenarios that show the forecasting capability of the Structural model for National murder. Each scenario is accompanied by the assumptions for the independent variables feeding up the model up to year 2019.

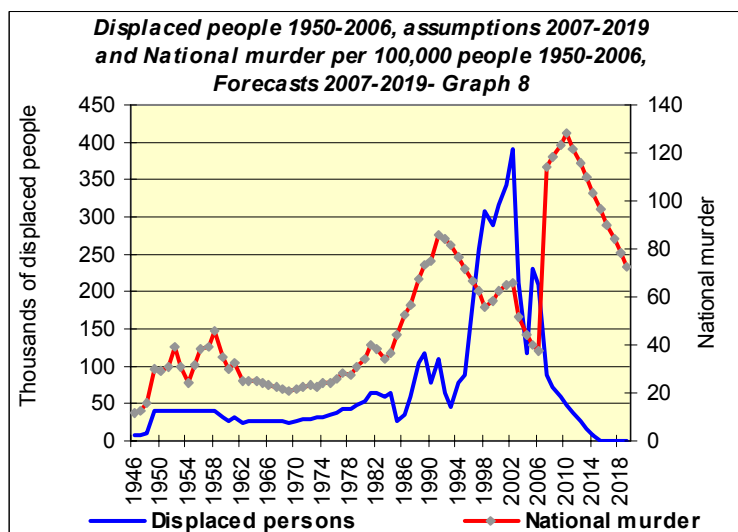
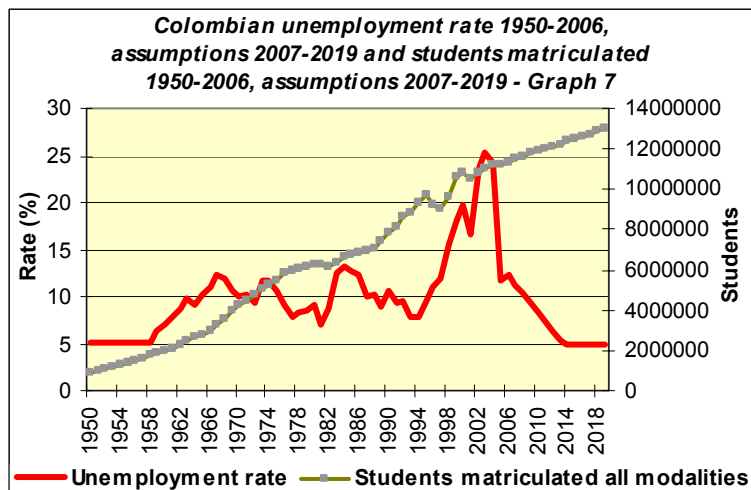
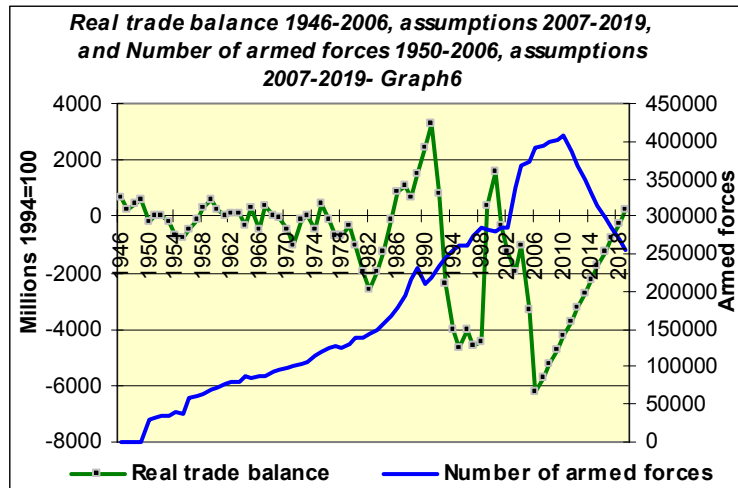
Each of the 17 scenarios assume that up to year 2019 the country is not having additional outburst of violence as the one experienced in 1948 (so the independent dummy variable B for *Bogotazo* continues with the value of zero up to 2019), and after the second presidential period of Dr. Alvaro Uribe the country starts again the alternation in power every 4 years (so the dummy CL1 for National Front years becomes 1 in 2002 up to 2019²³). I want to warn the reader about the big jump in terrorist murder for year 2005 which is shown in all of the scenarios shown, this is as a consequence of the immense efforts realized by the government at reducing displaced people during the last years. The model shows statistically the strong inverse relationship between terrorist murder and displaced people, a situation that shows the big dilemma facing Colombian policy makers²⁴.

SCENARIO 1 – Assumptions

The real trade balance starts reducing from -5738 millions of pesos in 2007 becoming positive in year 2019 with 262 millions of real pesos 1994, the process is achieved by yearly increments of 100 millions up to year 2019; total armed forces grow at 1% from 2007 to 2010, in year 2011 starts decreasing annually at 5% up to 2019; the unemployment rate decreases annually at 2% from 2007 to 2013, and remains constant at 5% from 2014 to 2019; students enrolled in all modalities increases at annually at 1% after 2003 up to 2019; displaced people follows the trend estimated by the National Planning Department up to 2010, from 2011 to 2014 they diminish annually by 10,000 people, becoming zero from 2015 to 2019 (Figures 6 to 8). Per capita murder reaches 72.9 by year 2019.

²³ Previously I had mentioned that from 1994 to 2006 the country had experience alternation in power.

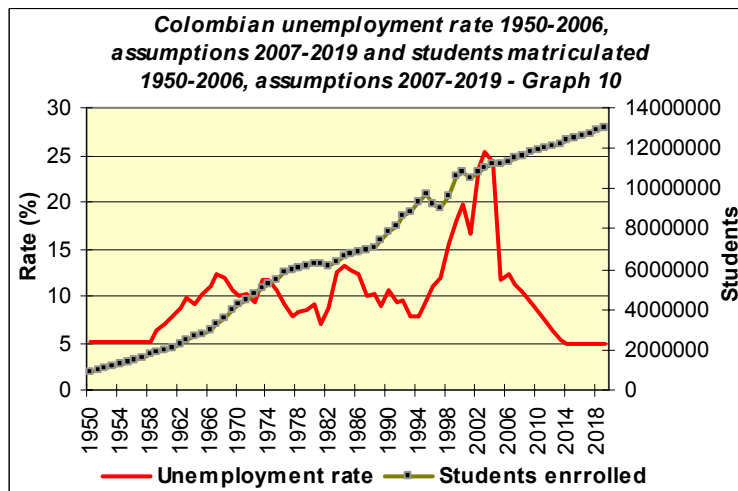
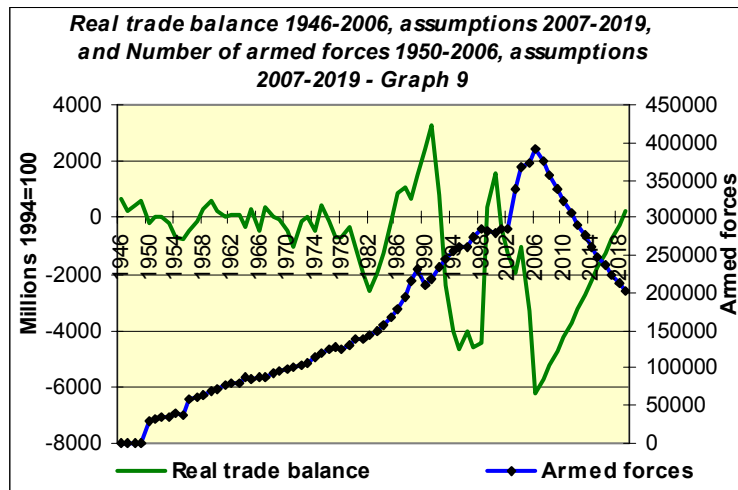
²⁴ All of the scenarios presented in this first section will show this instant jump in terrorist murder due to the fact of the strong reduction in displaced people during the last years. Additionally the scenarios presented are based on the assumption of a continuous declining trend for displacement which is expected and proposed as presidential policy during the next years up to year 2019 (Visión Colombia II Centenario, propuesta para discusión, resumen ejecutivo)

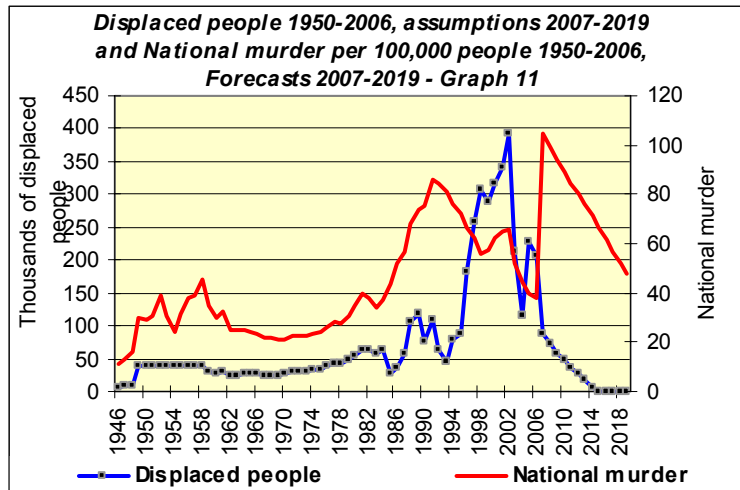


SCENARIO 2 – Assumptions – Moderate disarmament, Army troops diminishing at 5% from 2007 to 2019

The only change in this scenario compared to the last one, is army troops diminishing at 5% annually from 2007 to 2019.

Real trade balance increases by 100 millions annually from 2007 to 2019; students enrolled grow at 1% annually from 2007 to 2013, and stays at 5% from 2014 to 2019; displaced people follows the forecasts by DNP. As conclusion this scenario reduces National murder to 47.9 per capita in year 2019. Figures 9 to 11.

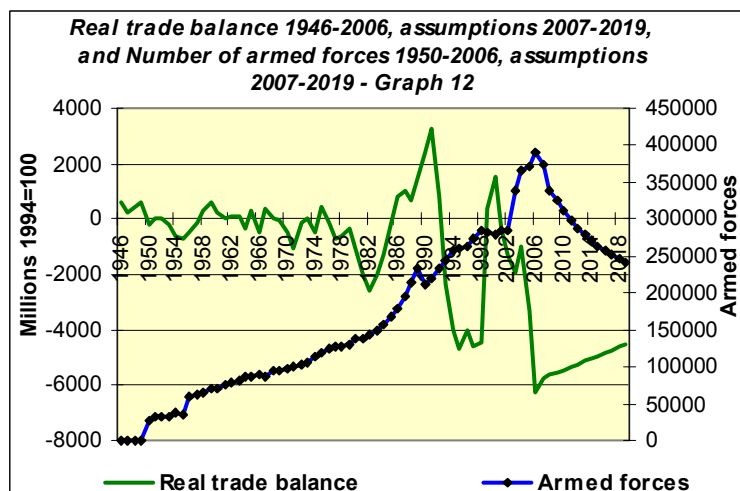


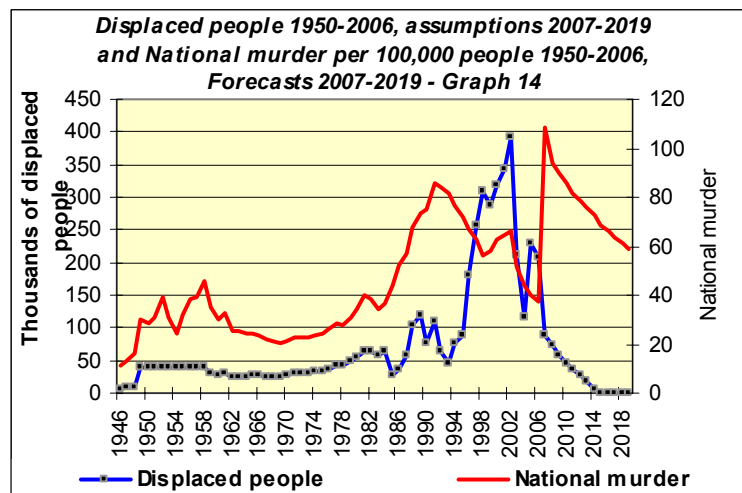
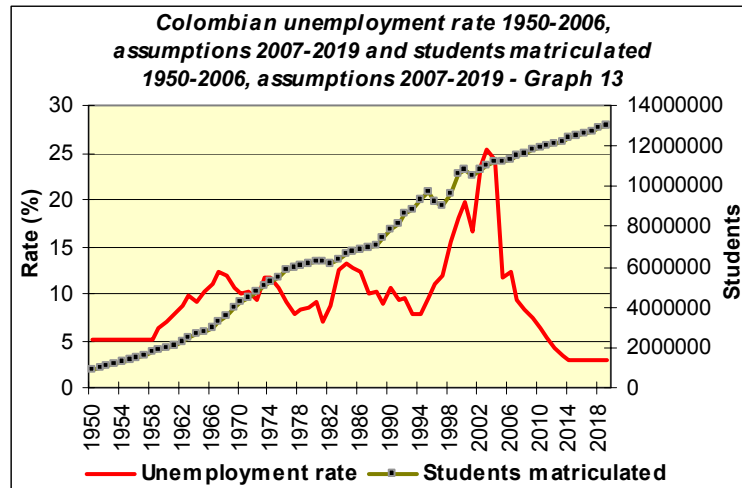


SCENARIO 3 – Assumptions. Army troops diminishing

Army troops diminish 9.7% in 2008, 4% from 2009 to 2012; 3% from 2013 to 2015; and 2% from 2016 to 2019.

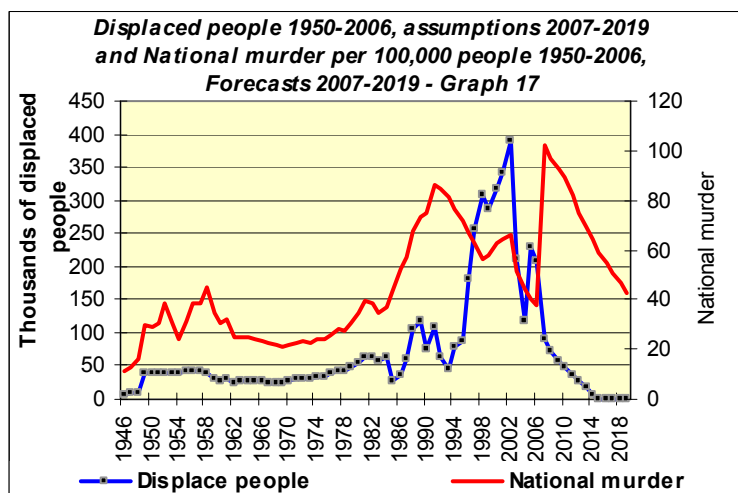
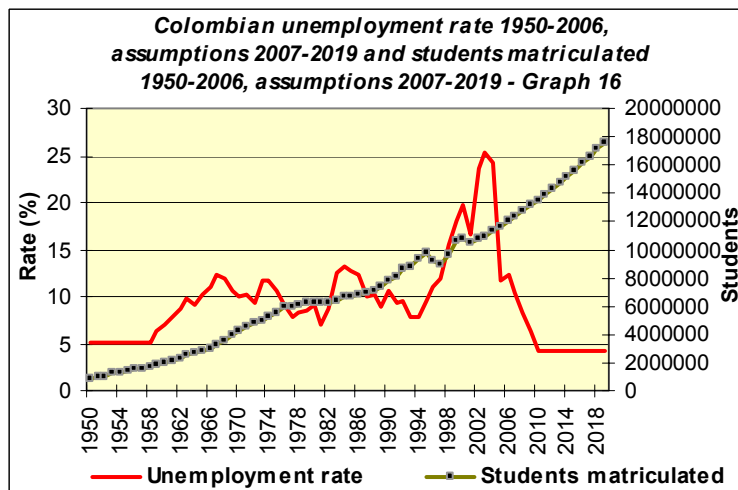
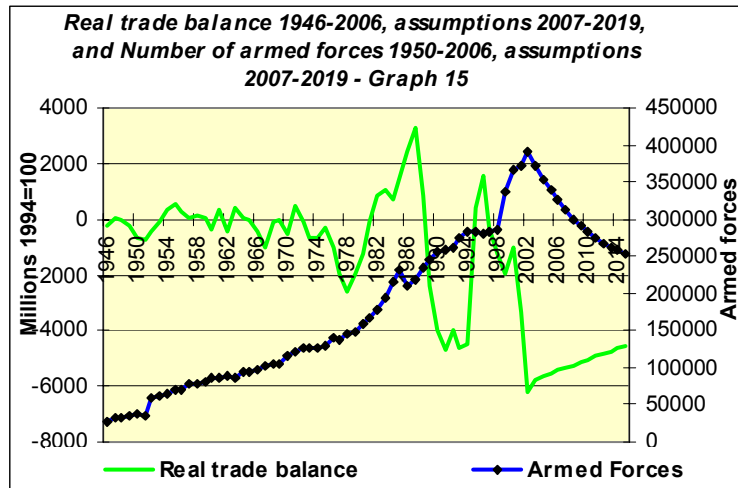
Real trade balance increases annually by 100 millions up to year 2019, a situation implying is still negative in 2019 with -4,538 millions; students enrolled grows at 1% annually; displacement follows the forecasts estimated by DNP becoming zero from 2015 to 2019; the unemployment rates falling annually by 1 percent point from 2008 to 2013, remaining constant at 3% from 2014 to 2019. National murder remains at 58.3 by 2019, and so scenario #2 proves better when compared with this one. Figures 12 to 14.





SCENARIO 4 – Social content introduced: students enrolled in all modalities increase annually at 3% from 2004 to 2019, while army forces diminish according to changes in last scenario.

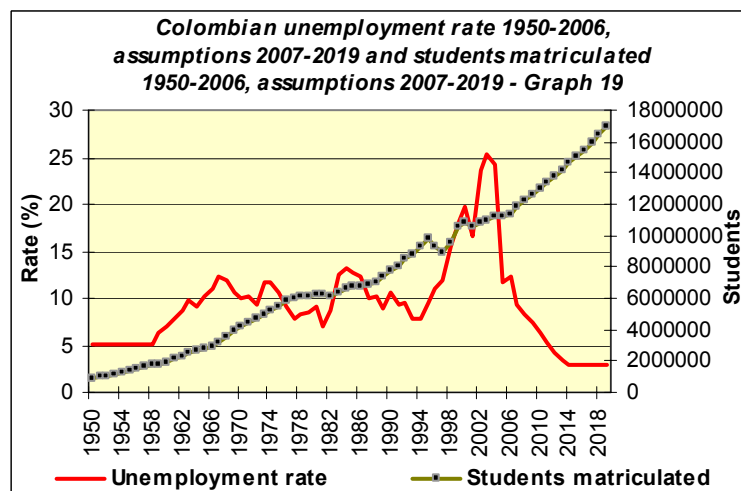
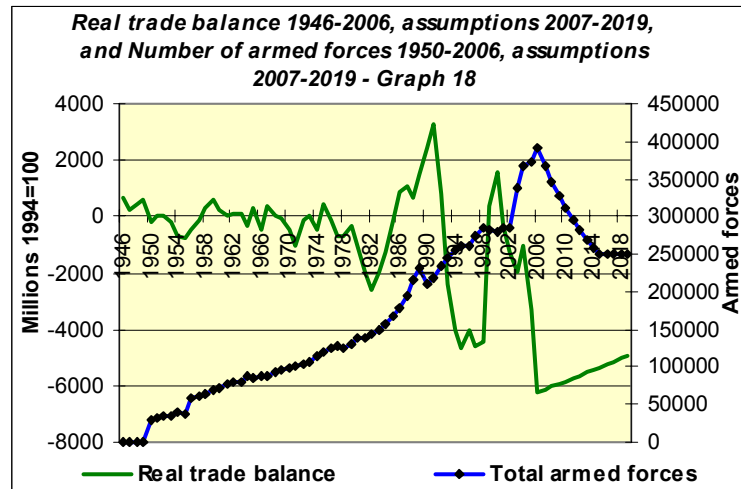
Armed forces diminish at 5%(2007-2008); 4%(2009-2012); 3%(2013-2015); 2%(2016-2018). Students matriculated increases annually at 3% annually from 2004 onward. The other variables remain the same compared to last scenario. Real trade balance increases annually 100 millions from 2008 to 2019 (still negative -4,538 by 2019); displacement follows assumptions by DNP; and the unemployment rate falling at 2% from 2007 to 2009 remaining constant at 4.35 from 2010 to 2019. As conclusion keeping the reduction in armed forces plus increasing enrollment reduces national murder to 42.3 per capita in year 2019.

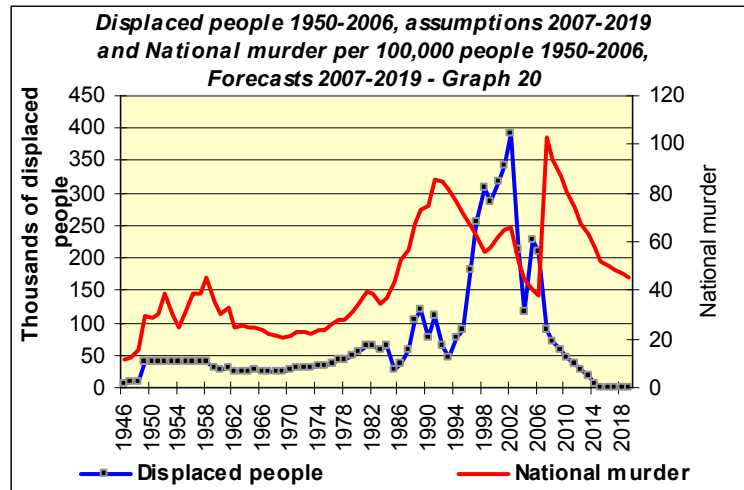


SCENARIO 5 – Pursuing further reduction in army troops, assumptions.

Army troops diminishing annually at 6% from 2007 to 2008; 5% from 2009 to 2012, 4% from 2013 to 2015; from 2016 onward remains constant with 248,965 men.

Real trade balance increases by 100 millions annually; students enrolled grows at 3% annually, displacement of people follows the forecasts estimated by DNP; the unemployment rate falls annually 2%. As conclusion a further disarmament reduces National murder to 45.1 per capita by 2019. Figures 18 to 20.

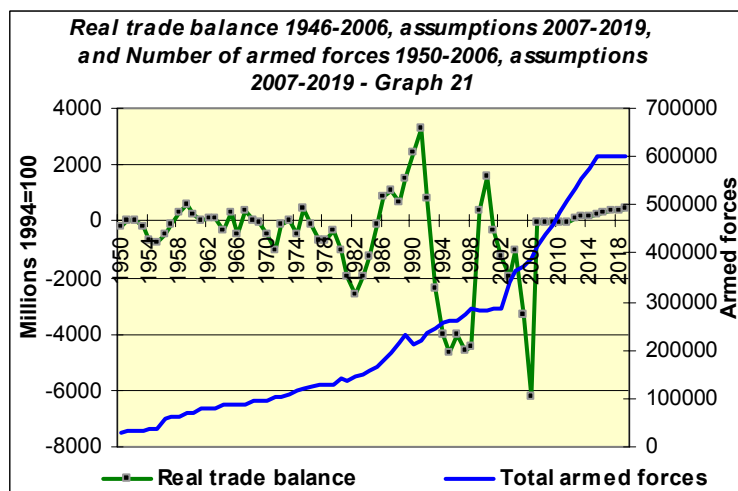


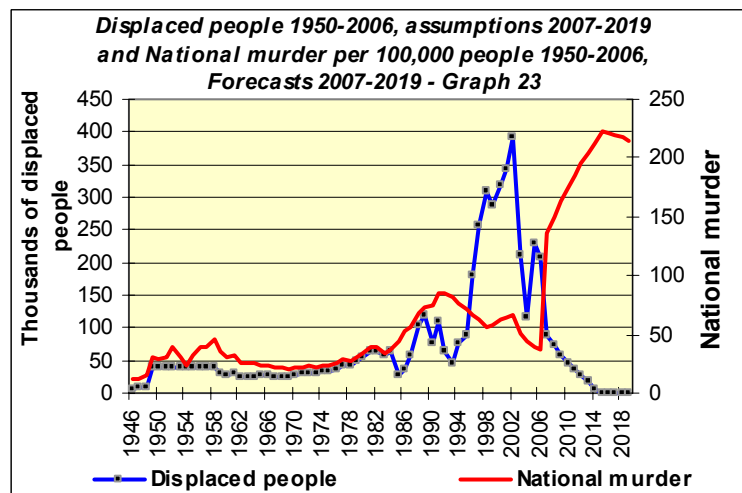
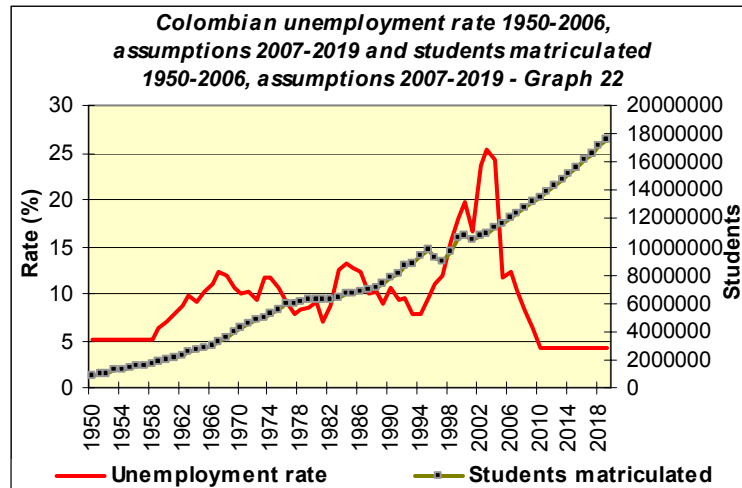


SCENARIO 6. Modeling the impact of a negative real trade balance 2007-2011, becoming positive for 2012-2019; and as well increasing armed forces.

The only change in this scenario is real trade balance. I assume the real trade balance is identical to what Colombia experienced during the “*National Front Years*”, basically replicating what happened to the real trade balance from 1960 to 1964, so starting in 2007, I model the impact of an oscillatory negative real trade balance, with -54 millions in 2007, -64 millions in 2008, -70 millions in 2009, -59 in 2010, and -38 in 2011. Later in 2012 becomes positive at 100 millions and start increasing that quantity annually up to 2019 getting 450 millions that year.

Armed forces increases annually at 6% (2007-2008), 5% (2009-2012), 4% (2013-2015), and remains constant with 600,689 men from 2016 to 2019; students enrolled grows at 3% annually, displaced people follows the pattern estimated by DNP and, the unemployment rates diminish at 2% annually. This scenario increases National murder to 215.10 per capita by year 2019. Figures 21 to 23.

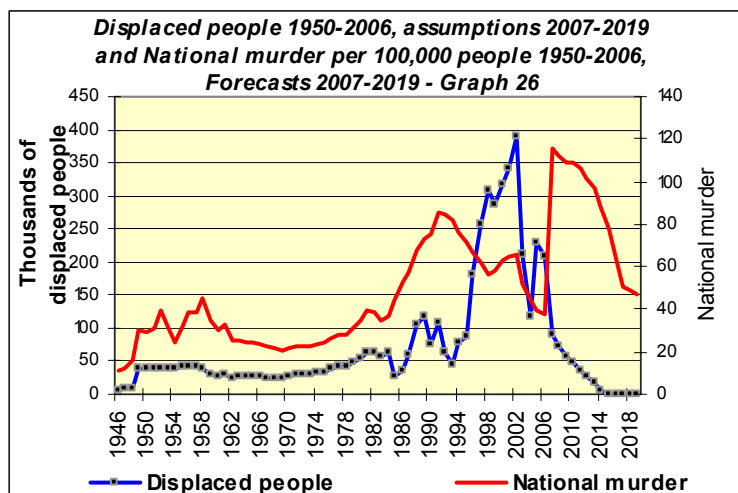
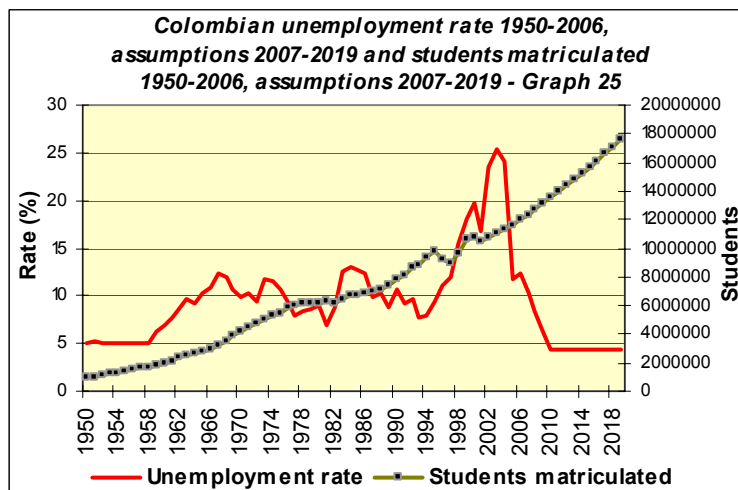
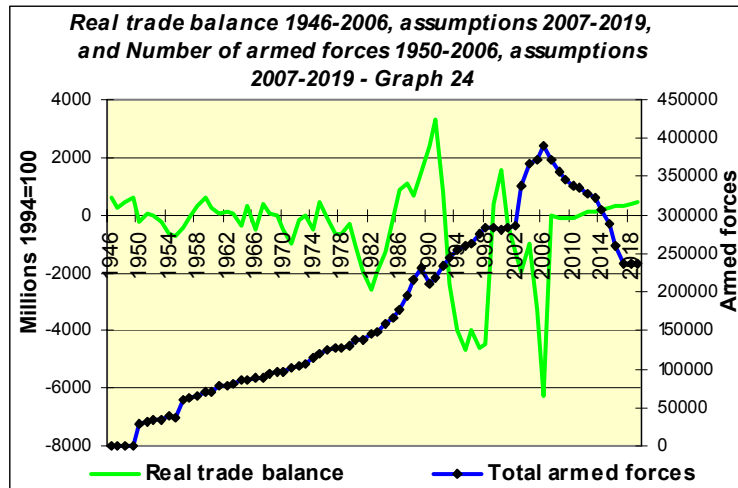




SCENARIO 7 – Moderate disarmament continued up to 2019. Assumptions

Armed forces diminish 5% in 2007; 4% 2008, 3% 2009, 2% 2010, 1% 2011, 2% in 2012, 2% 2013, 5% 2014, 6% 2015, 10% 2016, 9% 2017, from 2018 to 2019 I keep the forces from 2017 (235,717 men).

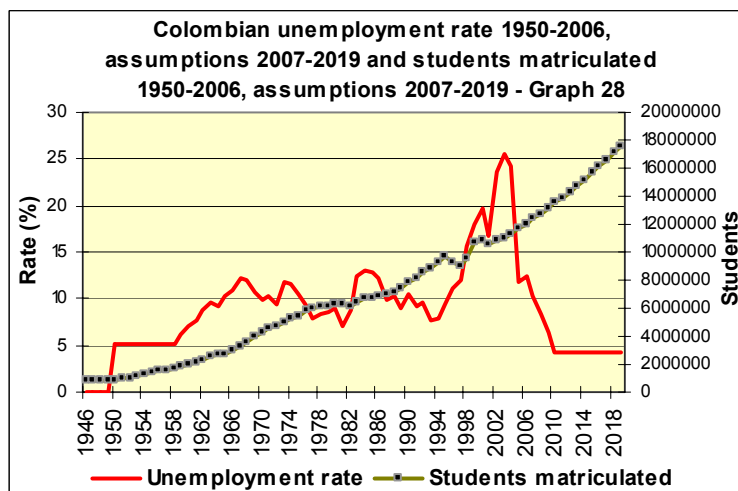
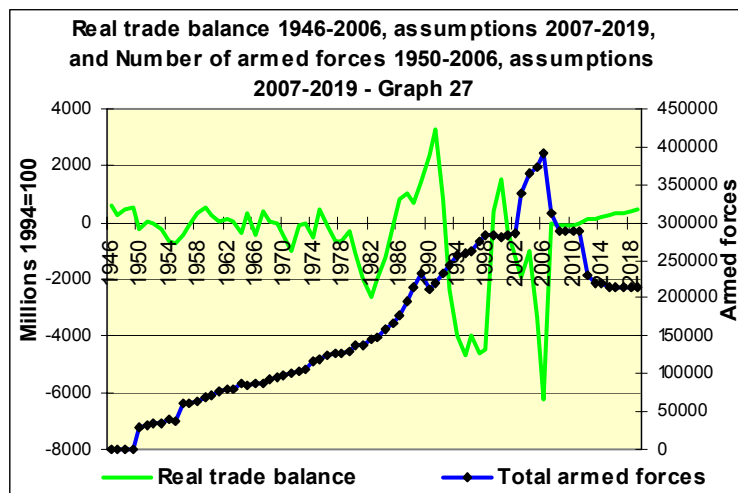
The real trade balance remains at the same figures of the National Front years; students enrolled growing at 3% annually; displacement follows the assumptions by DNP; unemployment rate falling at 2% annually, staying constant at 4.35% from 2010 to 2019. National murder gets 46.8 per capita by 2019. Figures 24 to 26.

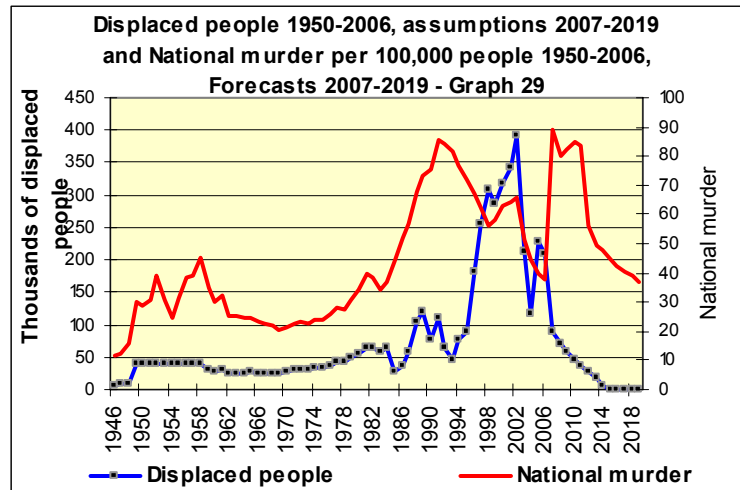


SCENARIO 8 – Beginning strong disarmament – army troops decreasing 20% in 2007.

Assumptions

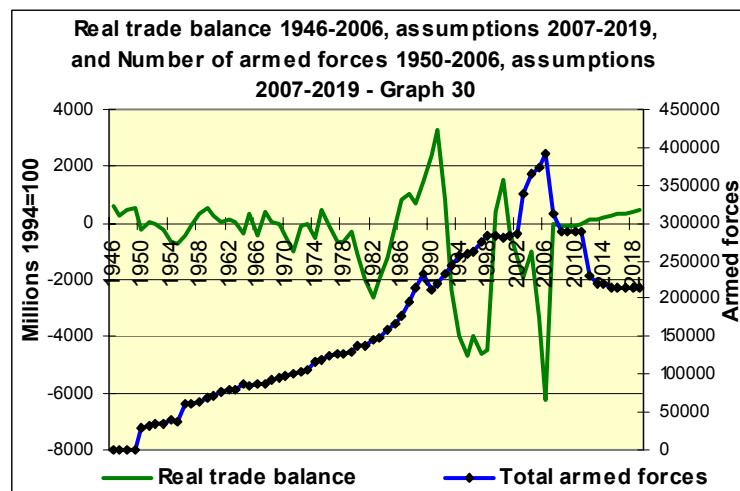
Armed forces diminish in this scenario variably: 20% in 2007 , 8% on 2008; then remain constant from 2009 to 2011. In 2012 they diminish 20%, and 5% in 2013, in 2014 they remain constant; in 2015 they reduce again by 2% and, from 2016 to 2019 they remain constant at 214,337 men. . The real trade balance remains at the same figures of the National Front years; students enrolled growing at 3% annually; displacement follows the assumptions by DNP; unemployment rate falling at 2% annually. As conclusion further reduction in disarmament reduces National murder accordingly to 36.9 per capita. Figures 27 to 29.

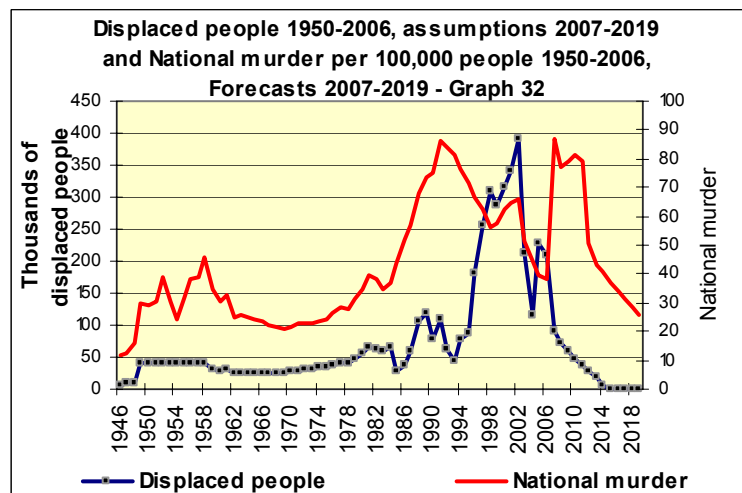
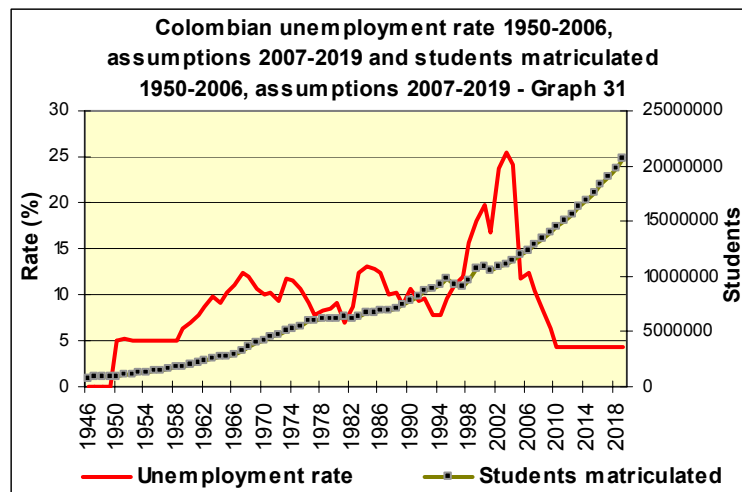




SCENARIO 9 – Increasing social content: Students enrolled growing at 4% annually. Assumptions

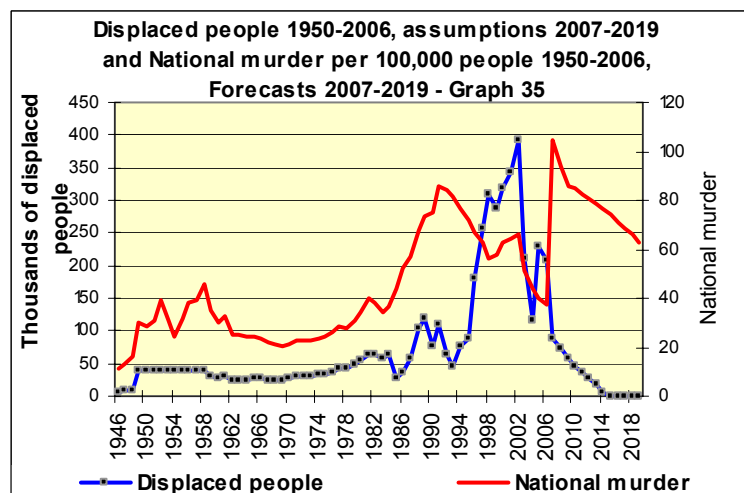
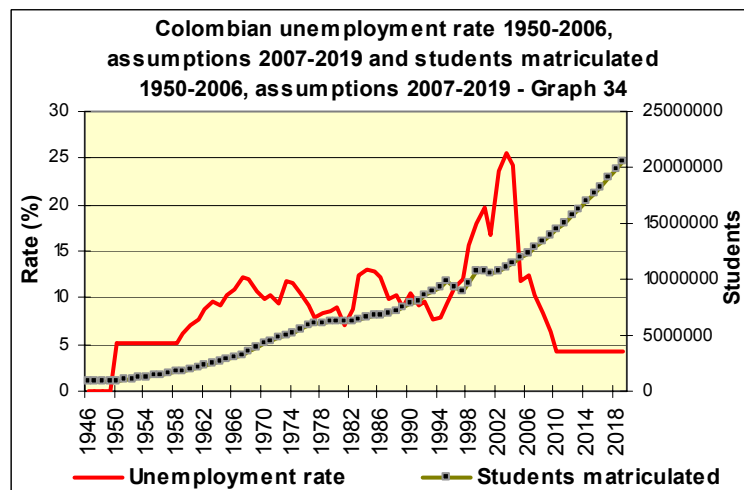
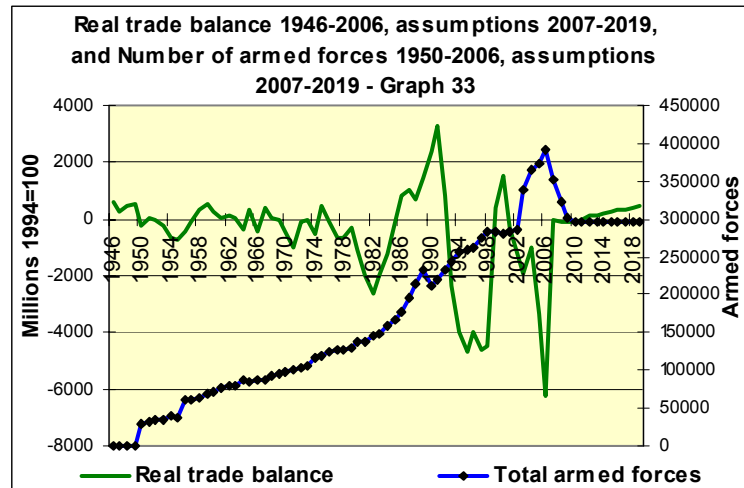
Armed forces diminish in this scenario variably identically as last scenario: 20% in 2007, 8% on 2008; then remain constant from 2009 to 2011. In 2012 they diminish 20%, and 5% in 2013, in 2014 they remain constant; in 2015 they reduce again by 2% and, from 2016 to 2019 they remain constant at 214,337 men. The real trade balance remains at the same figures of the National Front years; students enrolled growing at 4% annually; displacement follows the assumptions by DNP; unemployment rate falling at 2% annually. As conclusion further reduction in disarmament reduces plus the increase in enrollment reduce National murder, according to this scenario it appears that if we do not want to sacrifice troops we have to pursue further increases in enrollment. National murder reaches 36.9 per capita in 2019. Figures 31 to 32





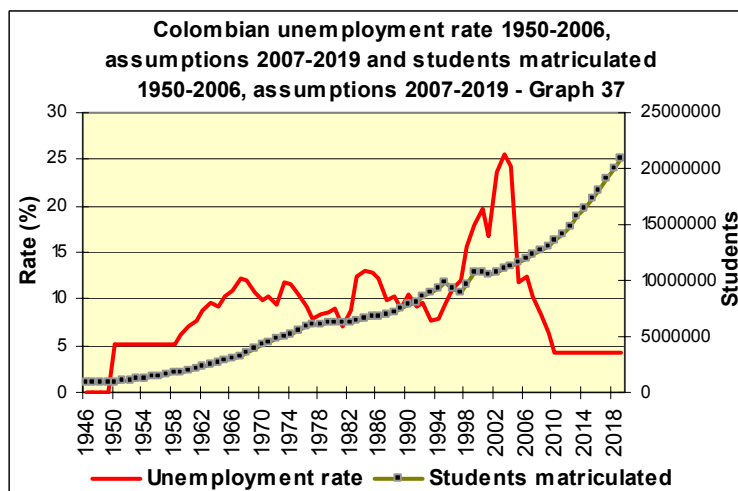
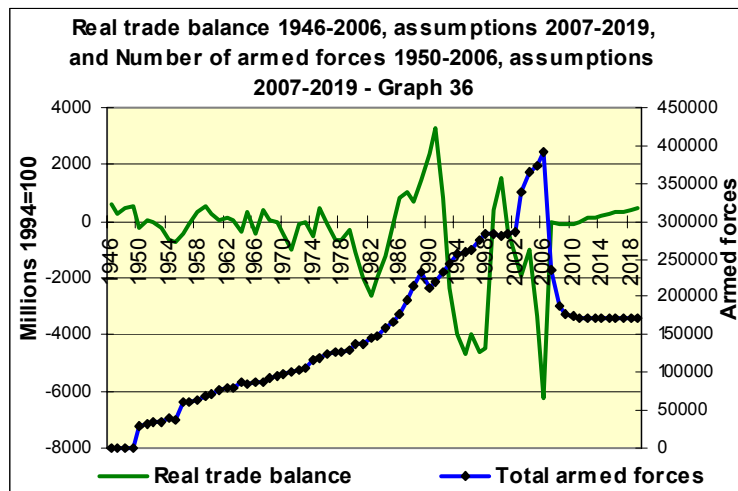
SCENARIO 10 – Modeling moderate disarmament, 10% in 2007

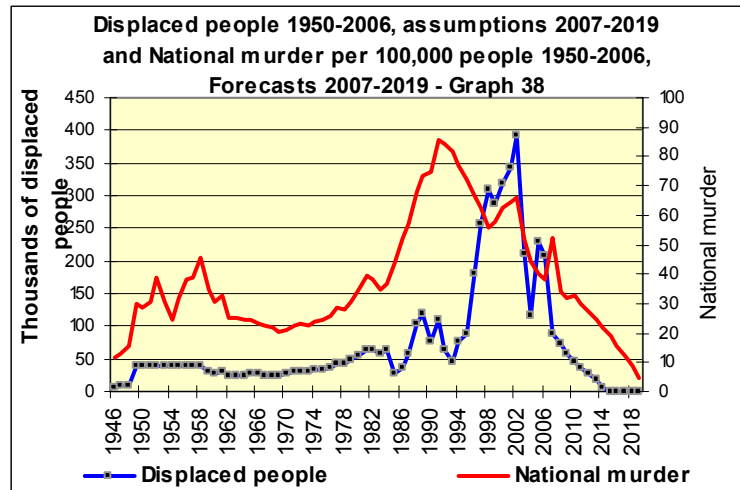
Armed forces decrease by 10% in 2007, 8% in 2008, 7% in 2009, and 2% in 2010; continuous from 2011 to 2019 with 295,381 men. The real trade balance remains at the same figures of the National Front years but from 2012 to 2019 becomes positive ending up in 2019 with 450 millions; students enrolled growing at 4% annually; displacement follows the assumptions by DNP; unemployment rate falling at 2% annually. National murder gets 62.8 per capita in 2019.



SCENARIO 11 – Increasing social content, students growing at 5% annually, and strong disarmament of 40% in 2007.

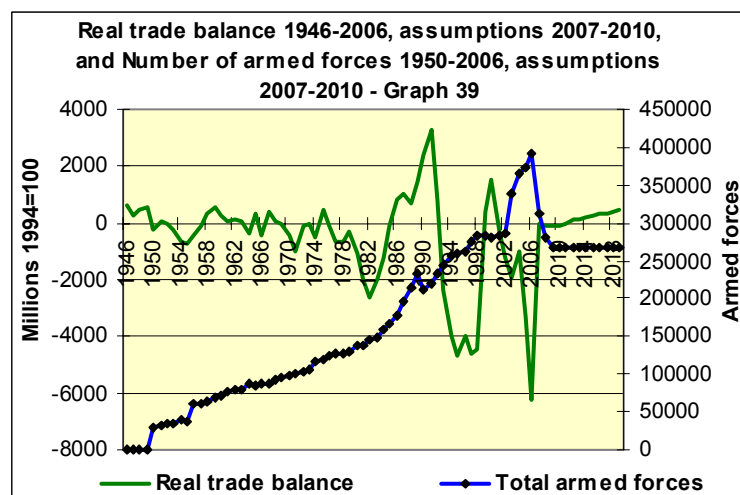
In this scenario, students enrolled are growing at 3% from 2004 to 2010, and at 5% from 2011 to 2019. The armed forces are disarmed at 40% in 2007, 20% in 2008, 5% in 2009, 2% in 2010, and 1% in 2011; from 2012 to 2019 remain constant at 172,982 men. The real trade balance oscillates around negative figures from 2007 to 2010 and becomes positive from 2011 to 2019; displacement follows the assumptions by DNP. As conclusion the policy mixture appears optimal, reducing National murder to 4.8 per capita in 2019. Figures 36 to 38.

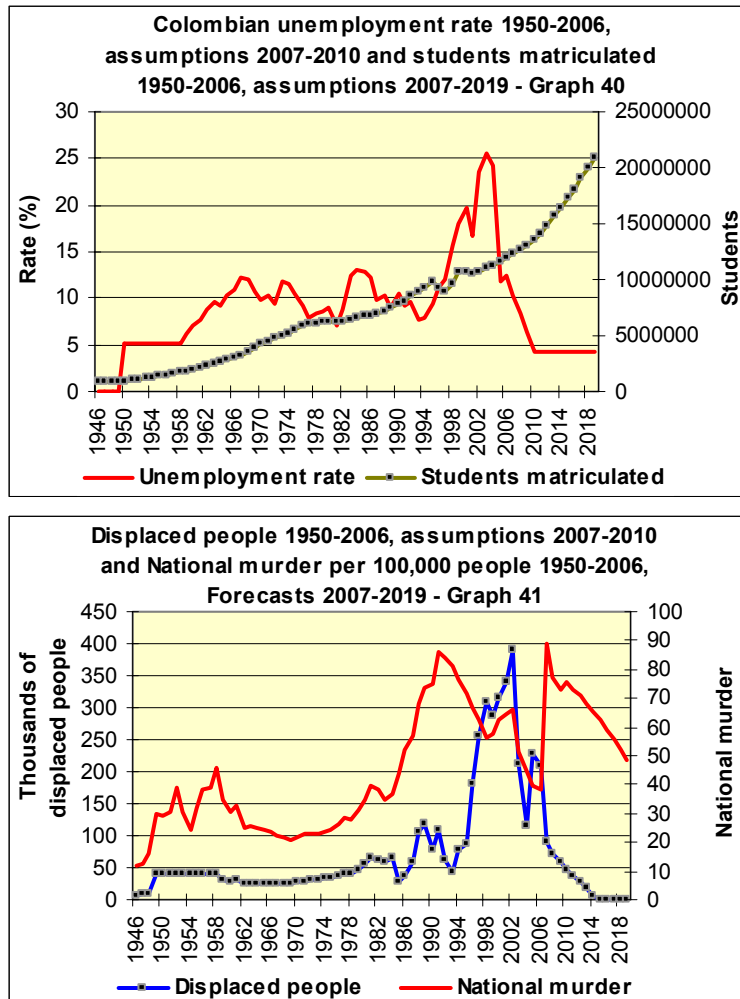




SCENARIO 12. Disarmament. Assumptions

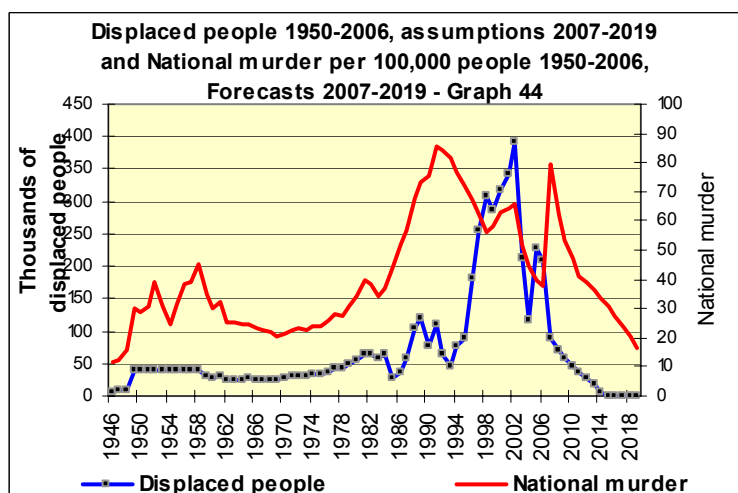
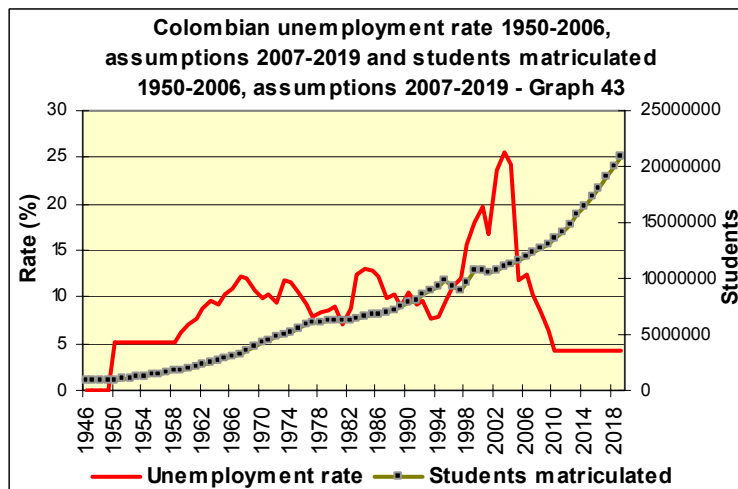
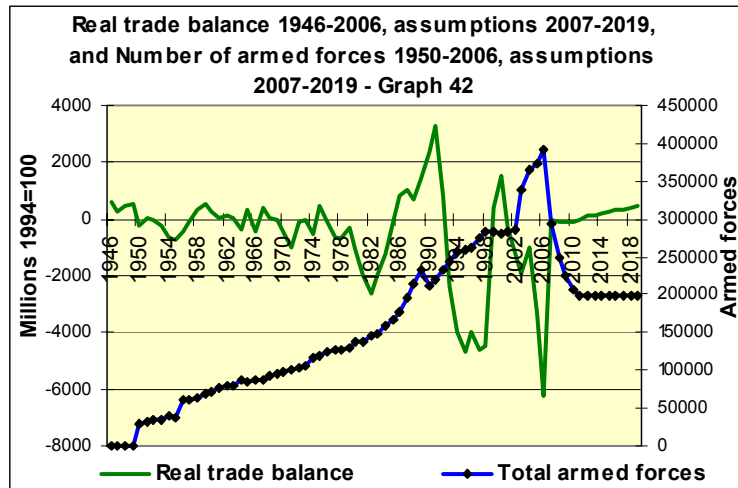
Armed forces diminish 20% in 2007, 10% in 2008, and 5% in 2009; from 2010 to 2019 they remain constant with 267,465 men. Students growing at 3% from 2004 to 2010, and at 5% from 2011 to 2019; the real trade balance oscillates around negative figures form 2007 to 2010 and becomes positive from 2011 to 2019; displacement follows the assumptions by DNP. National murder reaches 48.41 by 2019. Figures 39 to 41





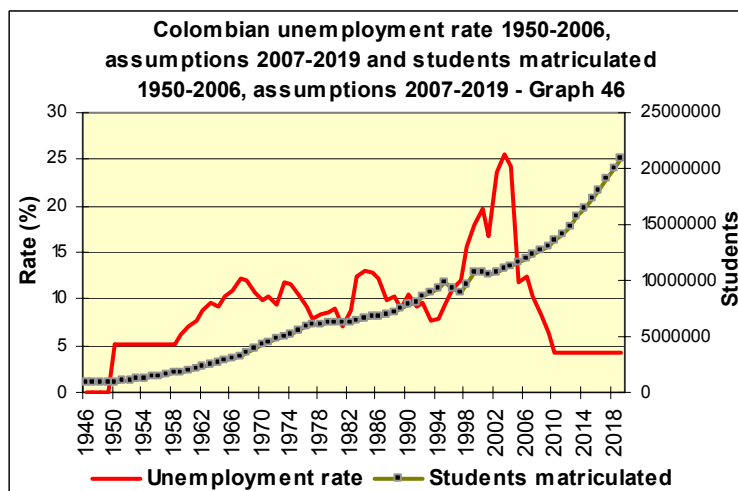
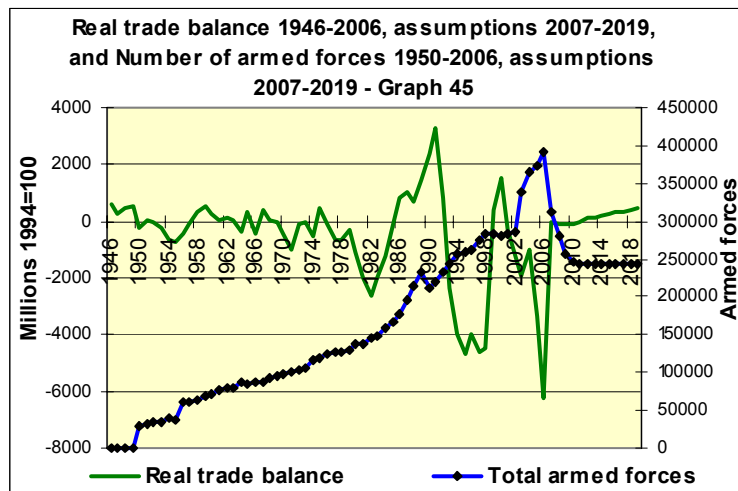
SCENARIO 13 – More than moderate disarmament. Armed forces diminish 25% the first year

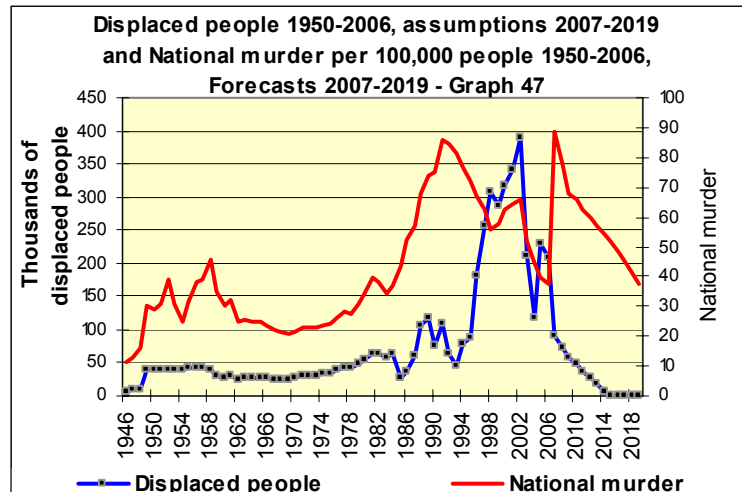
Armed forces diminish 25% in 2007, 15% in 2008, 10% in 2009, 8% on 2010, 4% in 2011, and remains constant from 2012 to 2019 with 198,134 men. Students growing at 3% from 2004 to 2010, and at 5% from 2011 to 2019; the real trade balance oscillates around negative figures from 2006 to 2010 and becomes positive from 2011 to 2019; displacement follows the assumptions by DNP. As conclusion this scenario reduces National murder to 16.4 per capita in 2019 Figures 42 to 44.



SCENARIO 14. Disarmament

Armed forces diminish by 20% in 2006, 10% in 2008, 8% in 2009, 4% in 2010, and 1% in 2011; from 2012 to 2019 they remain constant with 243,476 men. Students growing at 3% from 2004 to 2010, and at 5% from 2011 to 2019; the real trade balance oscillates around negative figures from 2007 to 2010, and becomes positive from 2011 to 2019; displacement follows the assumptions by DNP. This scenario reduces National murder to 37.6. Figures 45 to 47.

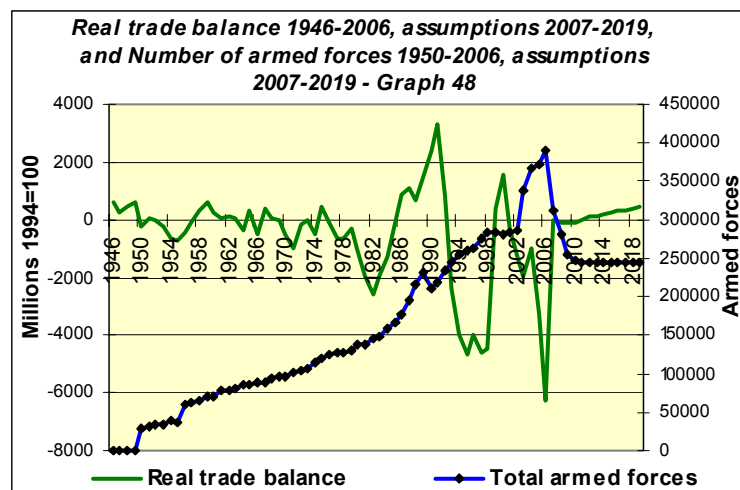


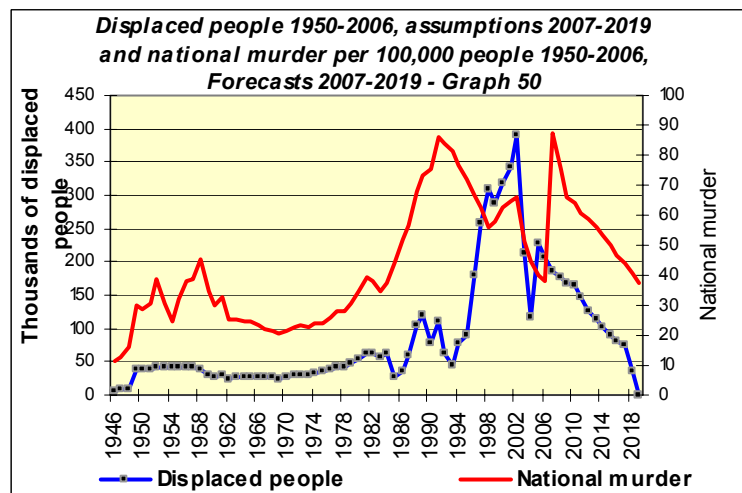
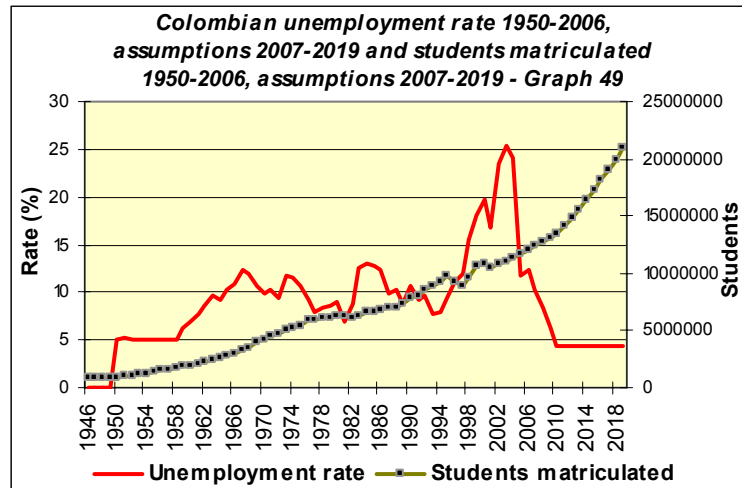


SCENARIO 15. Pessimistic scenario. The existence of displaced people by year 2018

For didactic purposes I model a slow reduction of displaced people, and its existence up to year 2018. According to this, displaced people diminish 10% in 2007, 6% in 2008, 4% in 2009, 3% in 2010, 10% in 2011, 15% in 2012, 10% in 2013, 10% in 2014, 10% in 2015, 10% in 2016, 10% in 2017, 50% in 2018, and becomes zero in 2019..

Armed forces also diminish by 20% in 2007, 10% on 2008, 8% on 2009, 4% on 2010, and 1% on 2011, from 2011 to 2019 they remain constant at 243,476. Students growing at 3% from 2004 to 2010, and at 5% from 2011 to 2019; the real trade balance oscillates around negative figures from 2007 to 2010, becoming positive from 2011 to 2019 with 450 millions. National murder gets 37.36 by year 2019. Figures 48 to 50.

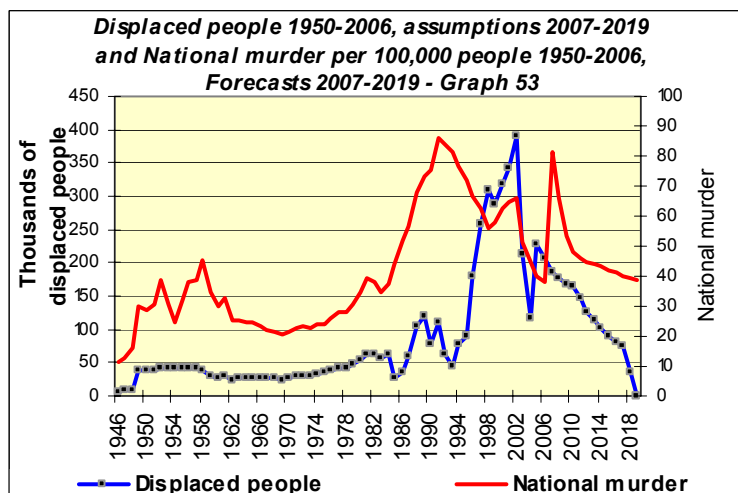
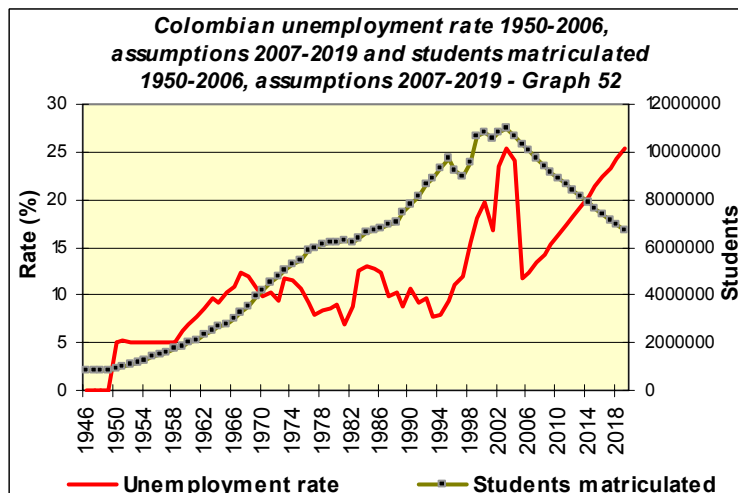
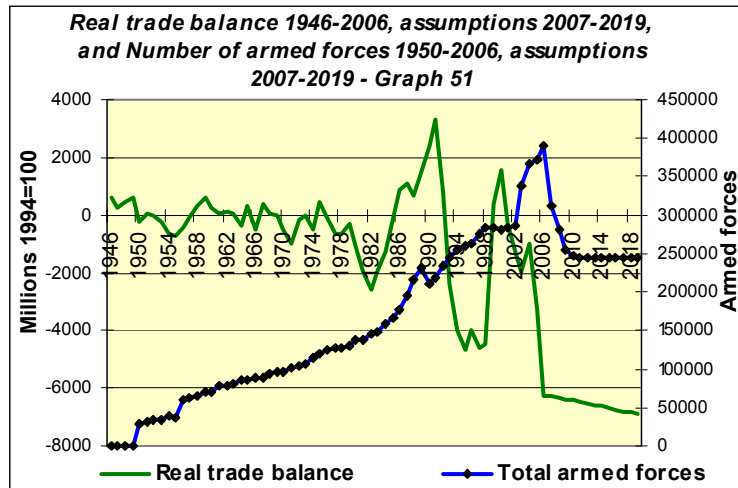




SCENARIO 16. Pessimistic scenario. High unemployment rate, displacement continues, armed forces increases

I model the assumption of a high unemployment rate up to year 2019, so it becomes 13.35 in 2007, increasing 1% by year getting 25.35 in 2019. Displaced people diminish 10% in 2007, 6% in 2008, 4% in 2009, 3% in 2010, 10% in 2011, 15% in 2012, 10% in 2013, 10% in 2014, 10% in 2014, 15% in 2015, 10% in 2016, 50% in 2018, becoming zero in 2019.

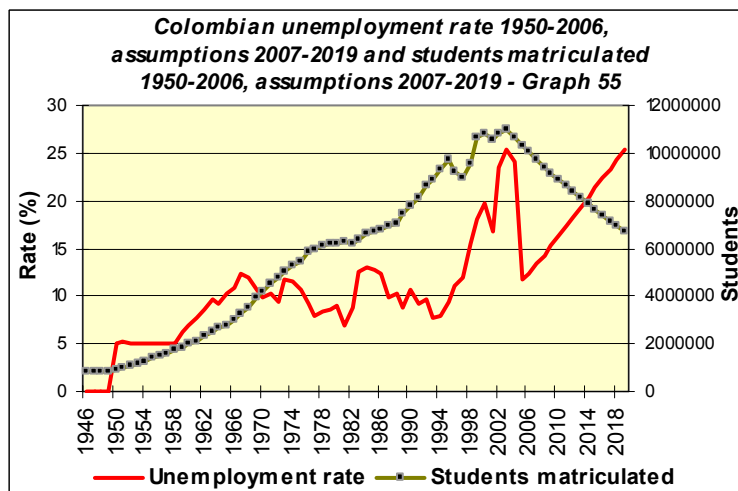
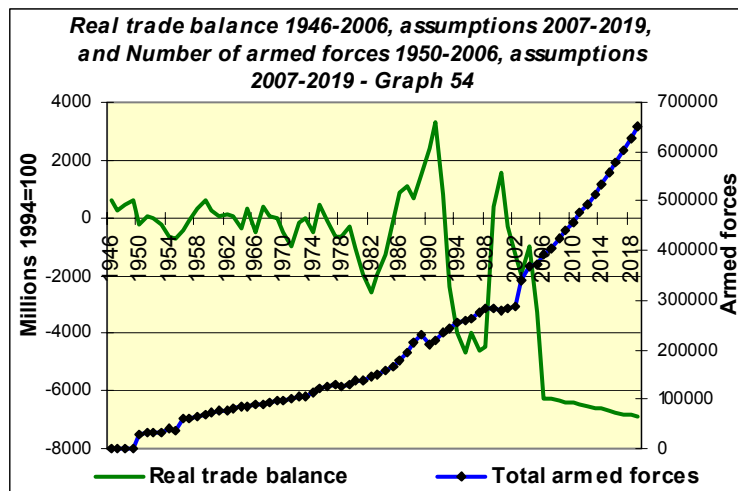
Armed forces also diminish by 20% in 2007, 10% in 2008, 8% in 2009, 4% in 2010, and 1% in 2011. Students growing at 3% from 2004 to 2010, and at 5% from 2011 to 2019; the real trade balance oscillates around negative figures from 2007 to 2010 and becomes positive from 2011 to 2019. The scenario places National murder at 38.51 by year 2019. Figures 51 to 53.

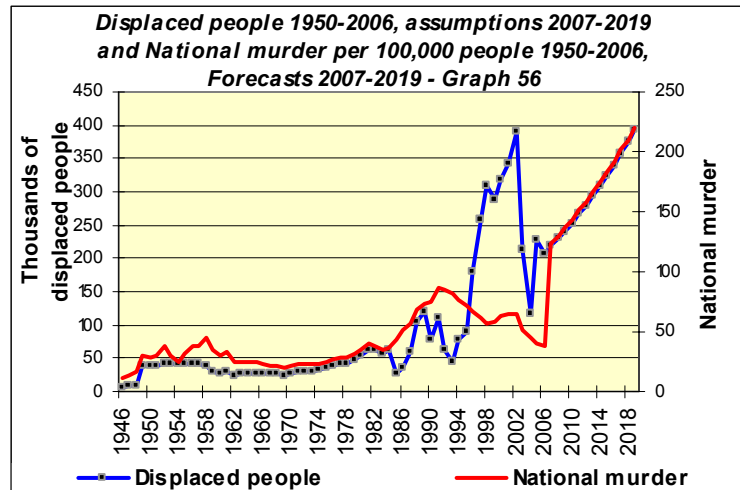


SCENARIO 17. PESSIMISTIC SCENARIO. A situation where everything shifts for the worst

In this hypothetical scenario, I assume there is no alternation in power, real trade balance starts deteriorating, students enrolled diminish, armed forces and displaced people continue increasing and the country keeps the high unemployment rate from last scenario.

Real trade balance continues its negative trend from 2007 to 2019, becoming -6,888 this last year, total armed forces increase at 4% annually from 2007 to 2019, displaced people increase at 5% annually from 2007 to 2019, students enrolled diminish at 4% annually from 2004 to 2019. As conclusion National murder jumps to 220.7 by year 2019. Figures 54 to 56.





A MODEL FOR CYCLICAL TERRORIST MURDER IN COLOMBIA, 1950 –2006 SCENARIOS BREAKING THE CYCLE OF TERRORIST MURDER BEFORE YEAR 2019

This second section presents 17 additional scenarios that show the forecasting capability of the model for cyclical terrorist murder. Each scenario is accompanied by the assumptions for the independent variables feeding up the model up to year 2019 (same assumptions as the model for National murder). The picking out and implementation for Colombia of one scenarios from the first section plus the scenario chosen for breaking the cycle of terrorist murder, and attacks gives born to the elected strategy reaching Sustainable Peace before year 2019.

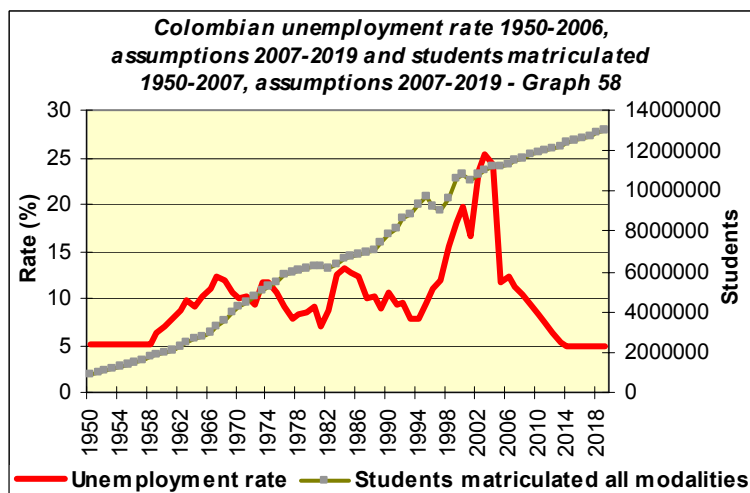
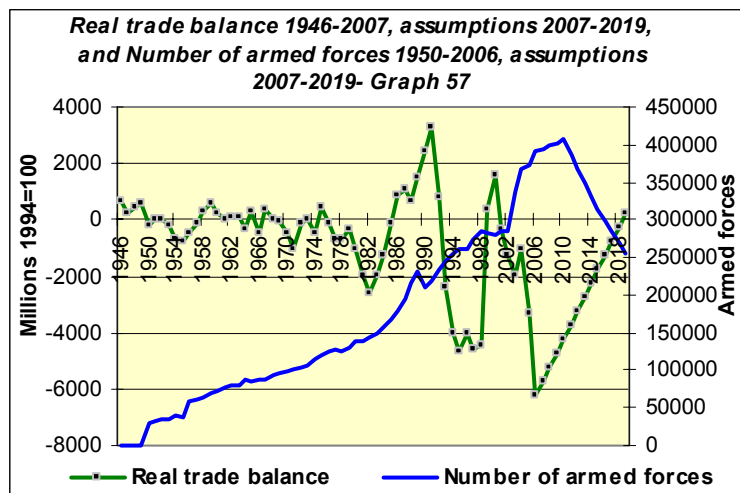
Each of the 17 scenarios assume that up to year 2019 the country is not having additional outburst of violence as the one experienced in 1948 (so the independent dummy variable B for *Bogotazo* continues with the value of zero up to 2019), and after the second presidential period of Dr. Alvaro Uribe the country starts again the alternation in power every 4 years (so the dummy CL1 for National Front years becomes 1 in 2002 up to 2019²⁵). I want to warn the reader about the big jump in terrorist murder for year 2005 which is shown in all of the scenarios shown, this is as a consequence of the immense efforts realized by the government at reducing displaced people during the last years. The model shows statistically the strong inverse relationship between terrorist murder and displaced people, a situation that shows the big dilemma facing Colombian policy makers²⁶.

²⁵ Previously I had mentioned that from 1994 to 2006 the country had experience alternation in power.

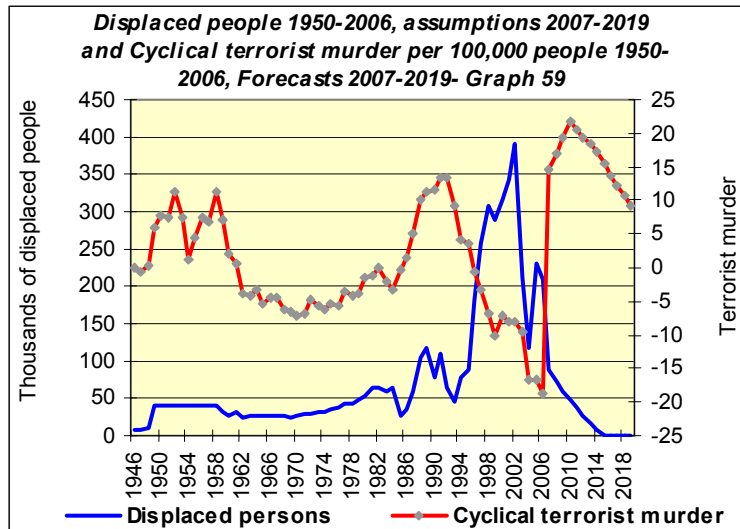
²⁶ All of the scenarios presented in this first section will show this instant jump in terrorist murder due to the fact of the strong reduction in displaced people during the last years. Additionally the scenarios presented are based on the assumption of a continuous declining trend for displacement which is expected

SCENARIO 1A – Assumptions

The real trade balance starts reducing from -5738 millions of pesos in 2007 becoming positive in year 2019 with 262 millions of real pesos 1994, the process is achieved by yearly increments of 100 millions up to year 2019; total armed forces grow at 1% from 2007 to 2010, in year 2011 starts decreasing annually at 5% up to 2019; the unemployment rate decreases annually at 2% from 2007 to 2013, and remains constant at 5% from 2014 to 2019; students enrolled in all modalities increases at annually at 1% after 2003 up to 2019; displaced people follows the trend estimated by the National Planning Department up to 2010, from 2011 to 2014 they diminish annually by 10,000 people, becoming zero from 2015 to 2019 (Figures 6 to 8). Per capita murder reaches 72.9 by year 2019.



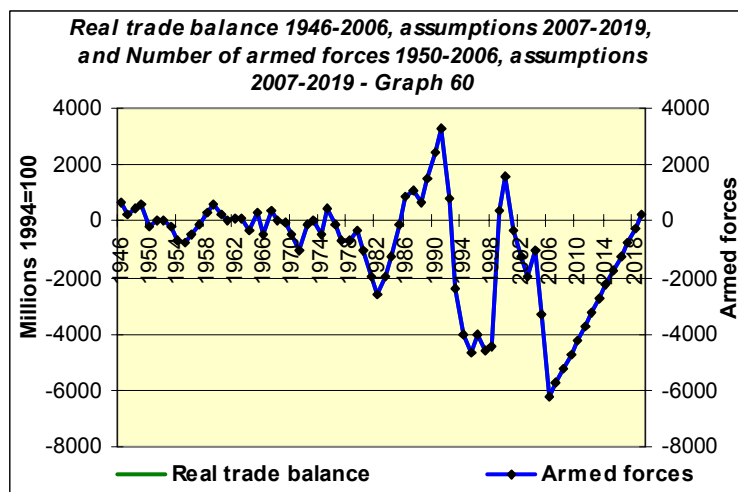
and proposed as presidential policy during the next years up to year 2019 (Visión Colombia II Centenario, propuesta para discusión, resumen ejecutivo)

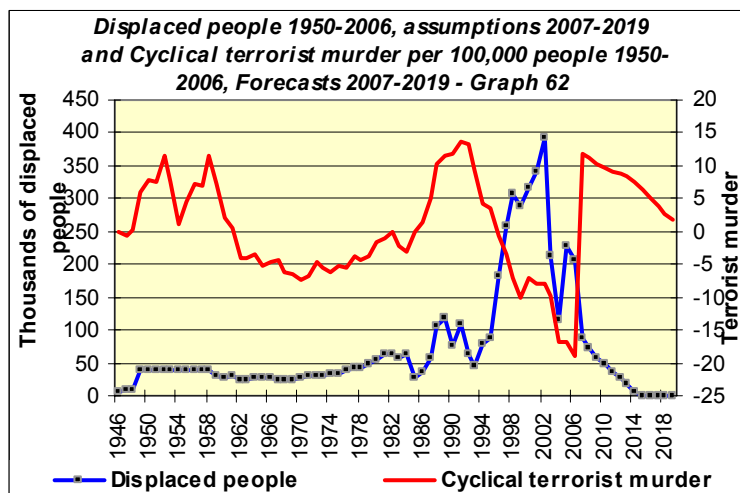
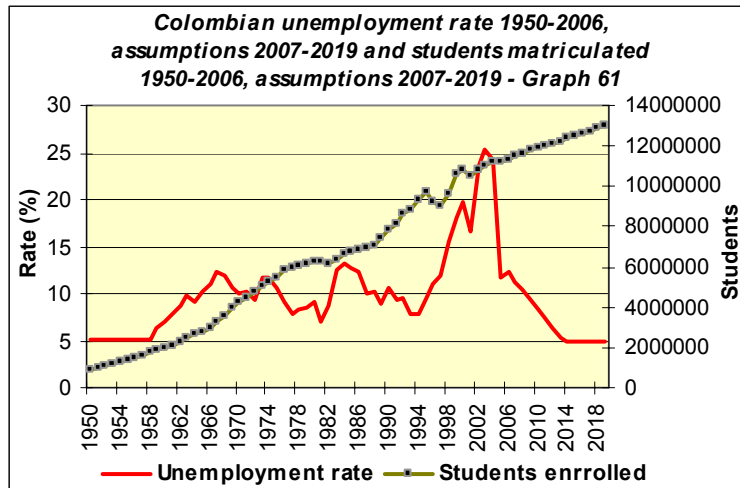


SCENARIO 2A – Assumptions – Moderate disarmament, Army troops diminishing at 5% from 2007 to 2019.

The only change in this scenario compared to the last one, is army troops diminishing at 5% annually from 2007 to 2019.

Real trade balance increases by 100 millions annually from 2007 to 2019; students enrolled grow at 1% annually from 2007 to 2013, and stays at 5% from 2014 to 2019; displaced people follows the forecasts by DNP. As conclusion this scenario reduces National murder to 47.9 per capita in year 2019. Figures 9 to 11.

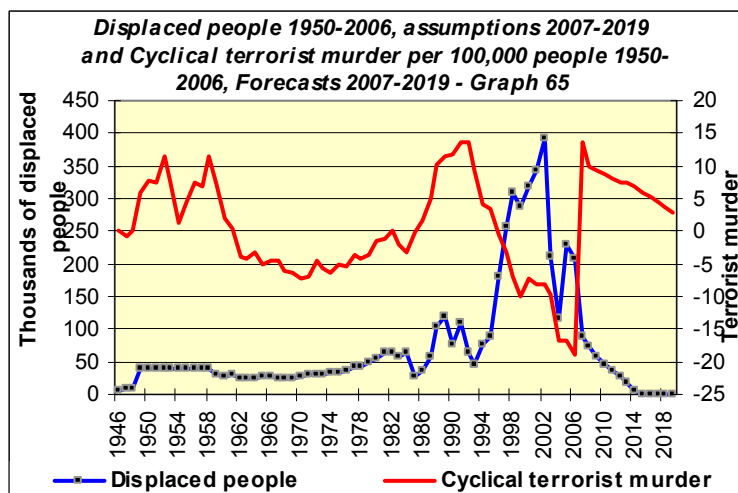
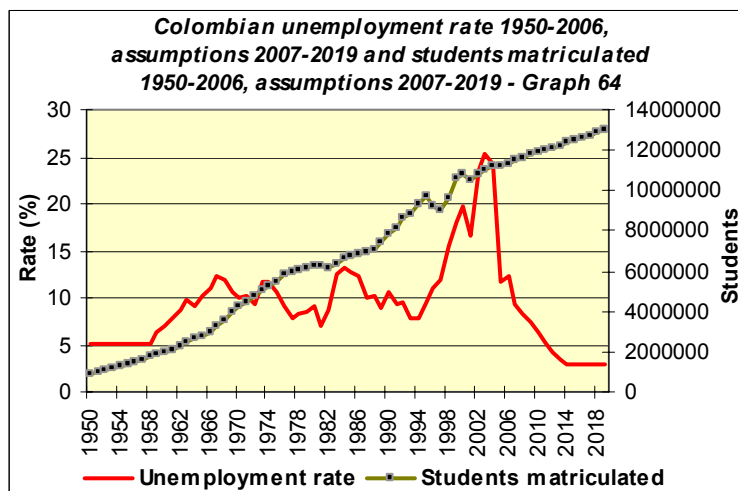
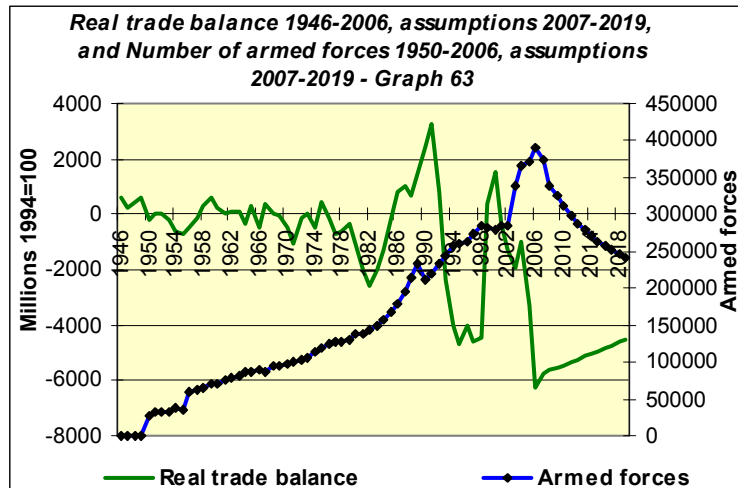




SCENARIO 3A – Assumptions. Army troops diminishing

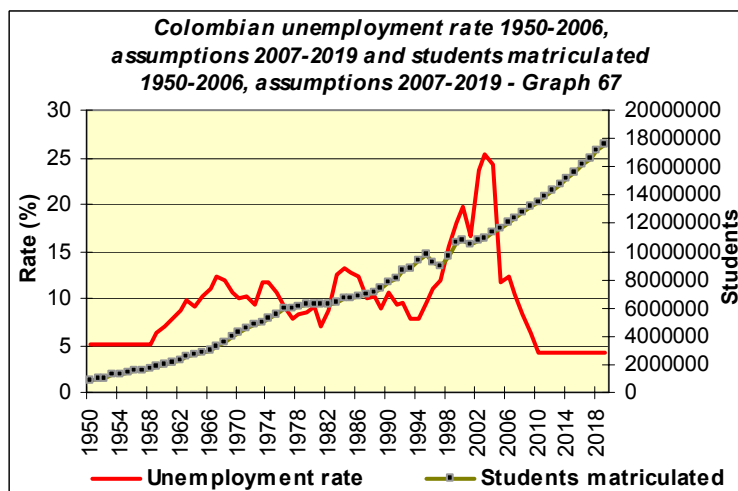
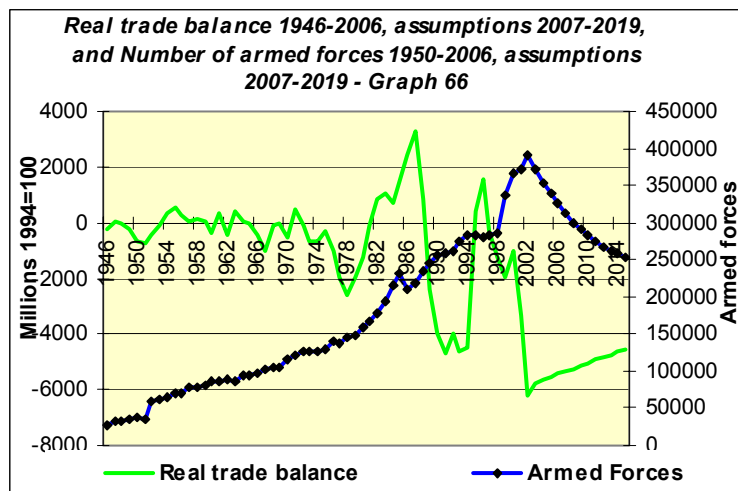
Army troops diminish 9.7% in 2008, 4% from 2009 to 2012; 3% from 2013 to 2015; and 2% from 2016 to 2019.

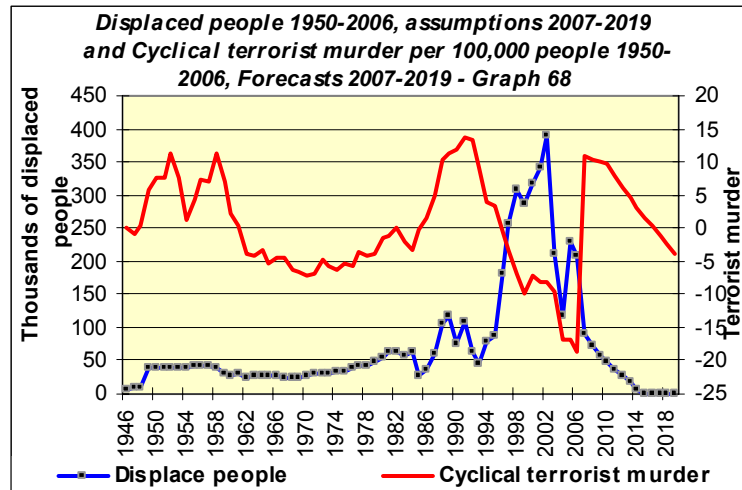
Real trade balance increases annually by 100 millions up to year 2019, a situation implying is still negative in 2019 with -4,538 millions; students enrolled grows at 1% annually; displacement follows the forecasts estimated by DNP becoming zero from 2015 to 2019; the unemployment rates falling annually by 1 percent point from 2008 to 2013, remaining constant at 3% from 2014 to 2019. National murder remains at 58.3 by 2019, and so scenario #2 proves better when compared with this one. Figures 12 to 14.



SCENARIO 4A – Social content introduced: students enrolled in all modalities increase annually at 3% from 2004 to 2019, while army forces diminish according to changes in last scenario.

Armed forces diminish at 5%(2007-2008); 4%(2009-2012); 3%(2013-2015); 2%(2016-2018). Students matriculated increases annually at 3% annually from 2004 onward. The other variables remain the same compared to last scenario. Real trade balance increases annually 100 millions from 2008 to 2019 (still negative -4,538 by 2019); displacement follows assumptions by DNP; and the unemployment rate falling at 2% from 2007 to 2009 remaining constant at 4.35 from 2010 to 2019. As conclusion keeping the reduction in armed forces plus increasing enrollment reduces national murder to 42.3 per capita in year 2019.

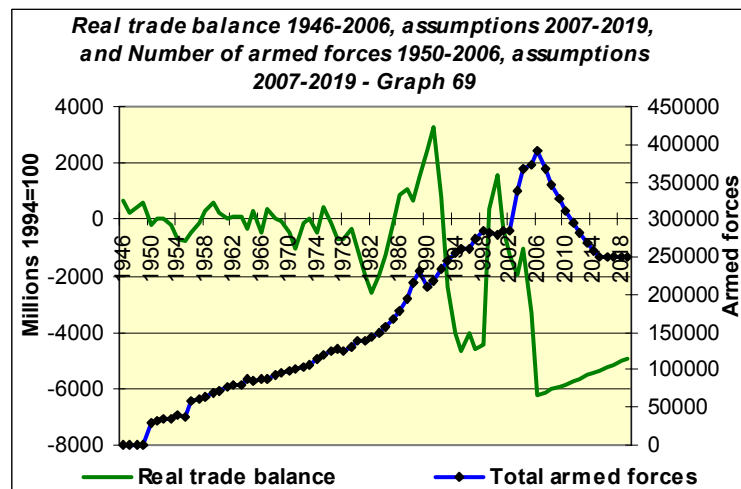


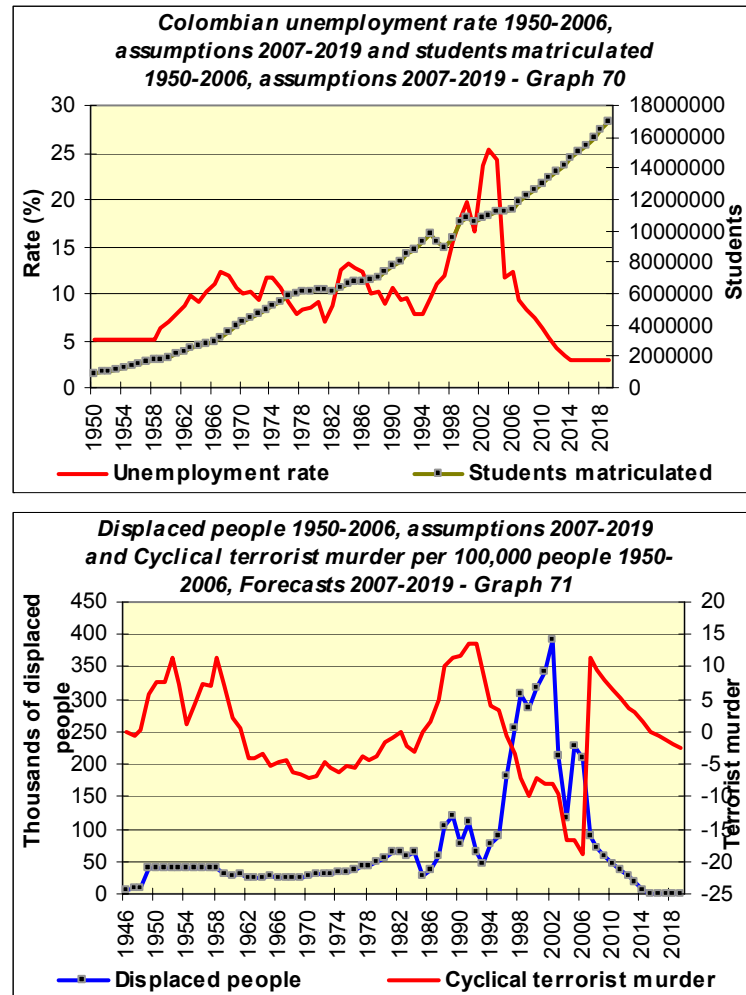


SCENARIO 5A – Pursuing further reduction in army troops, assumptions.

Army troops diminishing annually at 6% from 2007 to 2008; 5% from 2009 to 2012, 4% from 2013 to 2015; from 2016 onward remains constant with 248,965 men.

Real trade balance increases by 100 millions annually; students enrolled grows at 3% annually, displacement of people follows the forecasts estimated by DNP; the unemployment rate falls annually 2%. As conclusion a further disarmament reduces National murder to 45.1 per capita by 2019. Figures 18 to 20.

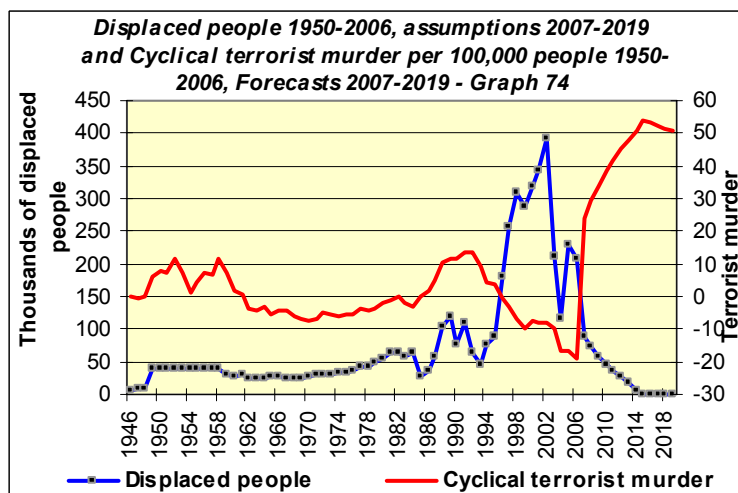
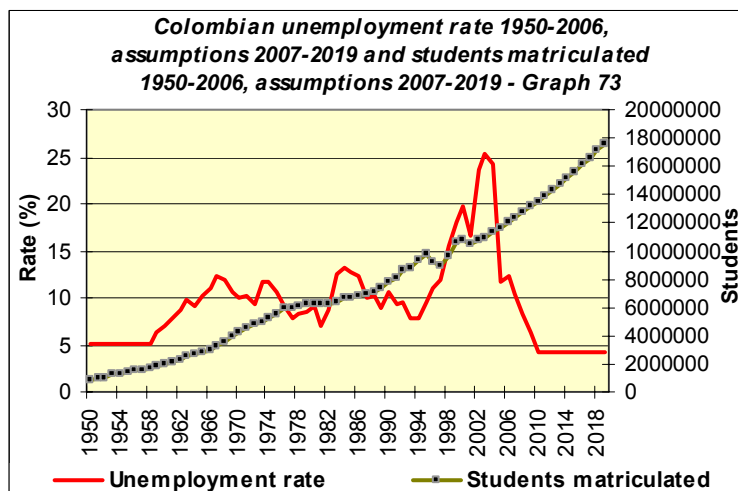
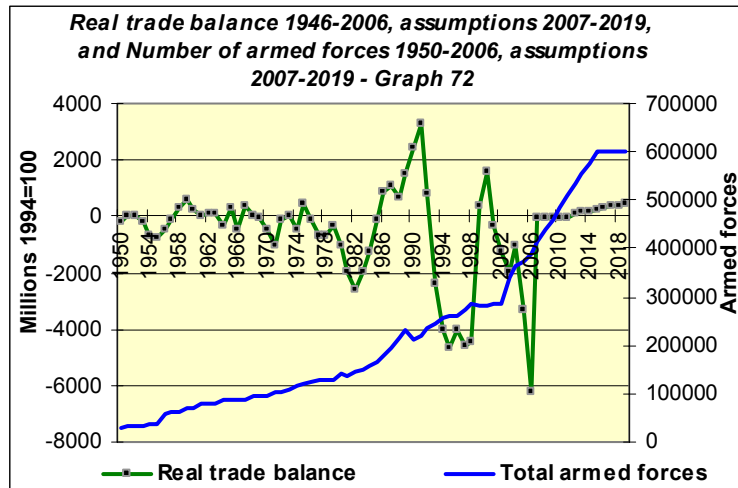




SCENARIO 6A - Modeling the impact of a negative real trade balance 2007-2011, becoming positive for 2012-2019; and as well increasing armed forces.

The only change in this scenario is real trade balance. I assume the real trade balance is identical to what Colombia experienced during the “*National Front Years*”, basically replicating what happened to the real trade balance from 1960 to 1964, so starting in 2007, I model the impact of an oscillatory negative real trade balance, with -54 millions in 2007, -64 millions in 2008, -70 millions in 2009, -59 in 2010, and -38 in 2011. Later in 2012 becomes positive at 100 millions and start increasing that quantity annually up to 2019 getting 450 millions that year.

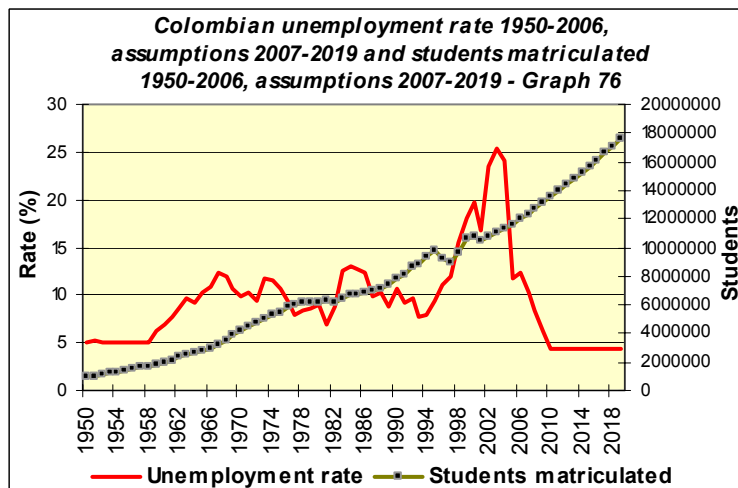
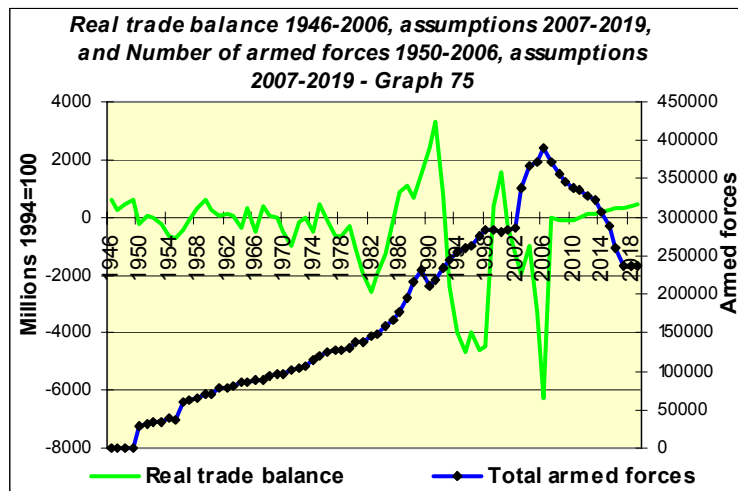
Armed forces increases annually at 6% (2007-2008), 5% (2009-2012), 4% (2013-2015), and remains constant with 600,689 men from 2016 to 2019; students enrolled grows at 3% annually, displaced people follows the pattern estimated by DNP and, the unemployment rates diminish at 2% annually. This scenario increases National murder to 215.10 per capita by year 2019. Figures 21 to 23.

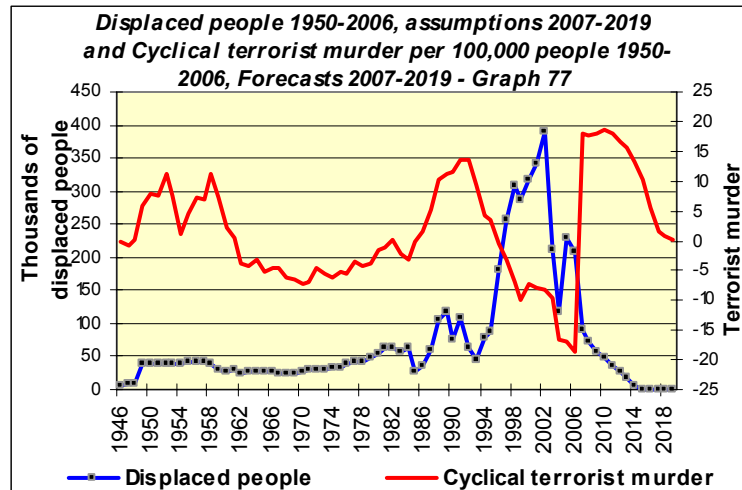


SCENARIO 7A – Moderate disarmament continued up to 2019. Assumptions

Armed forces diminish 5% in 2007; 4% 2008, 3% 2009, 2% 2010, 1% 2011, 2% in 2012, 2% 2013, 5% 2014, 6% 2015, 10% 2016, 9% 2017, from 2018 to 2019 I keep the forces from 2017 (235,717 men).

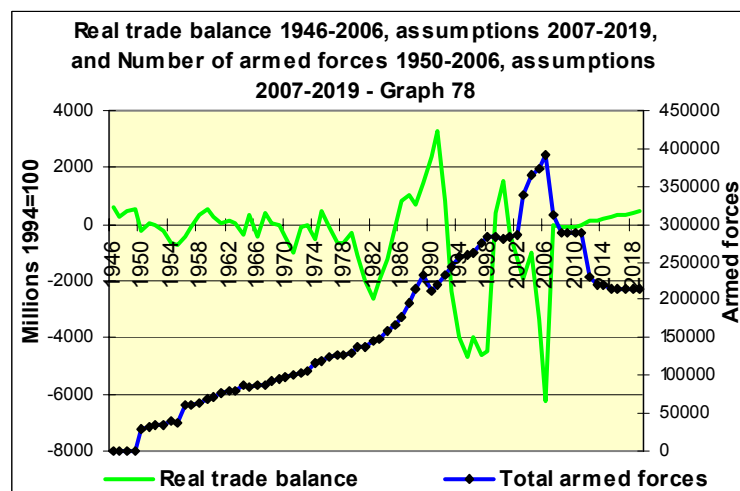
The real trade balance remains at the same figures of the National Front years; students enrolled growing at 3% annually; displacement follows the assumptions by DNP; unemployment rate falling at 2% annually, staying constant at 4.35% from 2010 to 2019. National murder gets 46.8 per capita by 2019. Figures 24 to 26.

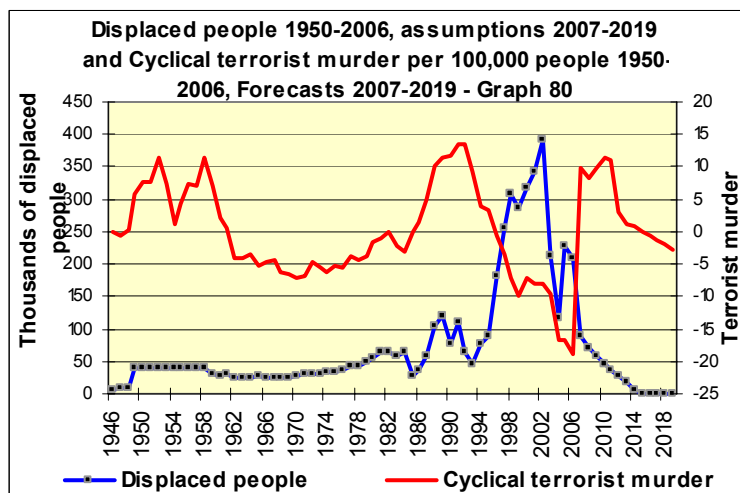
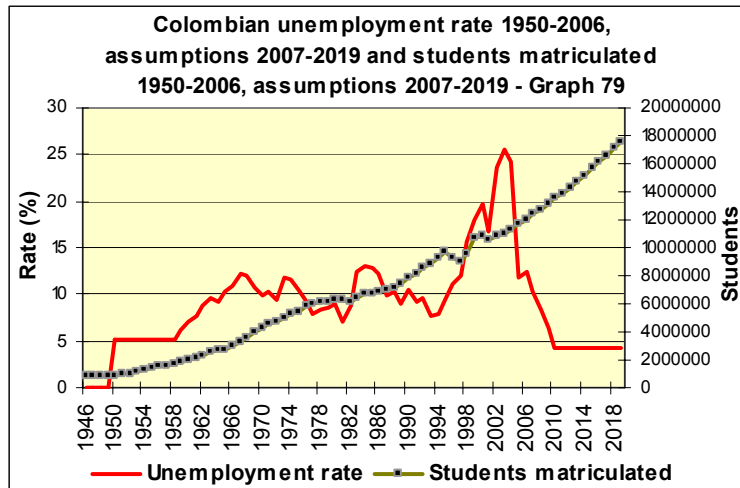




SCENARIO 8A – Beginning strong disarmament – army troops decreasing 20% in 2007. Assumptions

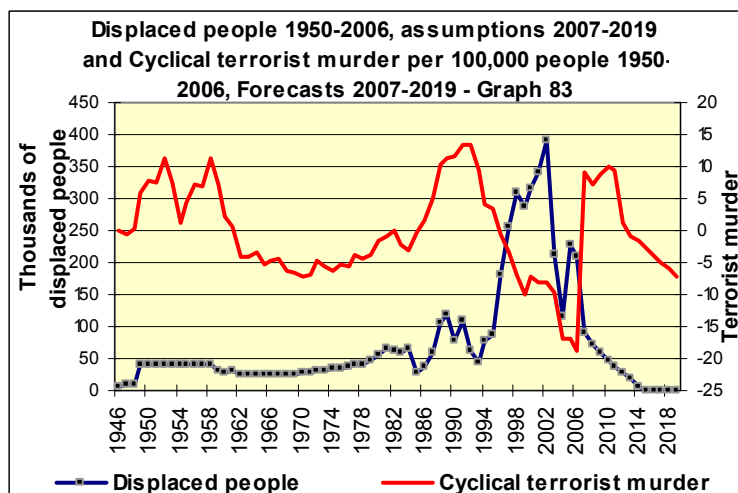
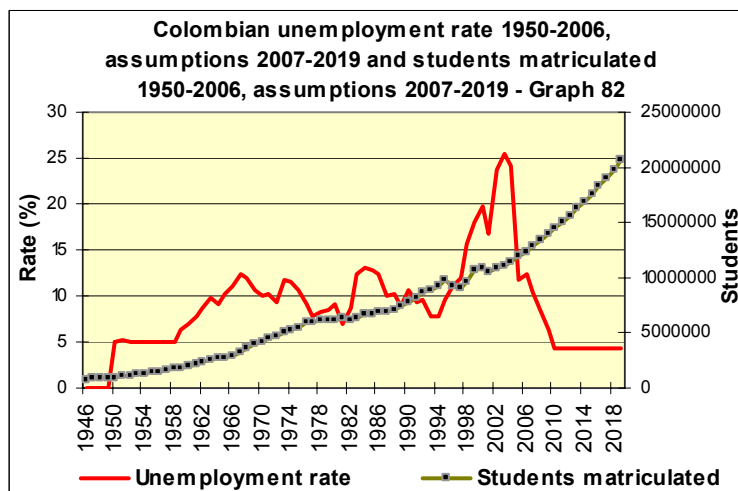
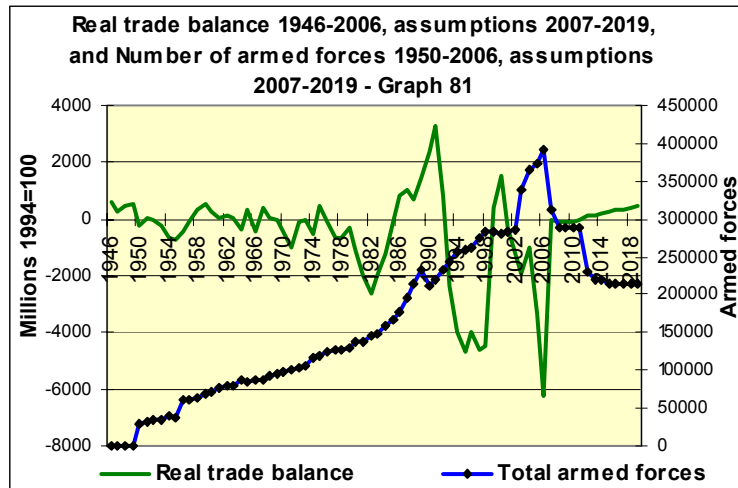
Armed forces diminish in this scenario variably: 20% in 2007 , 8% on 2008; then remain constant from 2009 to 2011. In 2012 they diminish 20%, and 5% in 2013, in 2014 they remain constant; in 2015 they reduce again by 2% and, from 2016 to 2019 they remain constant at 214,337 men. . The real trade balance remains at the same figures of the National Front years; students enrolled growing at 3% annually; displacement follows the assumptions by DNP; unemployment rate falling at 2% annually. As conclusion further reduction in disarmament reduces National murder accordingly to 36.9 per capita. Figures 27 to 29.





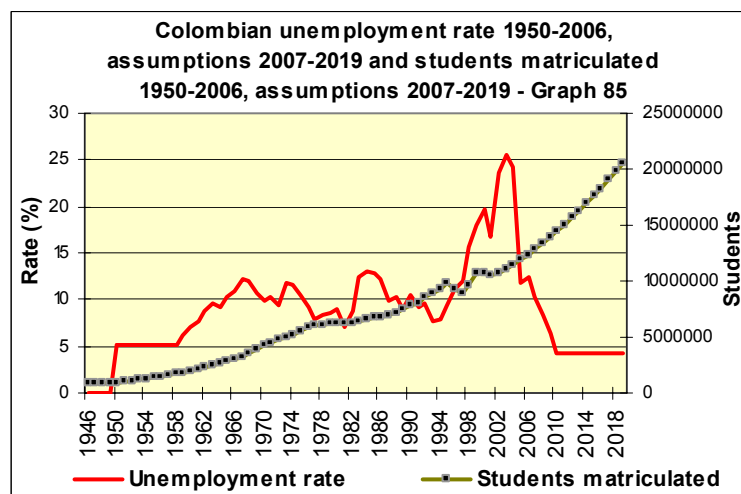
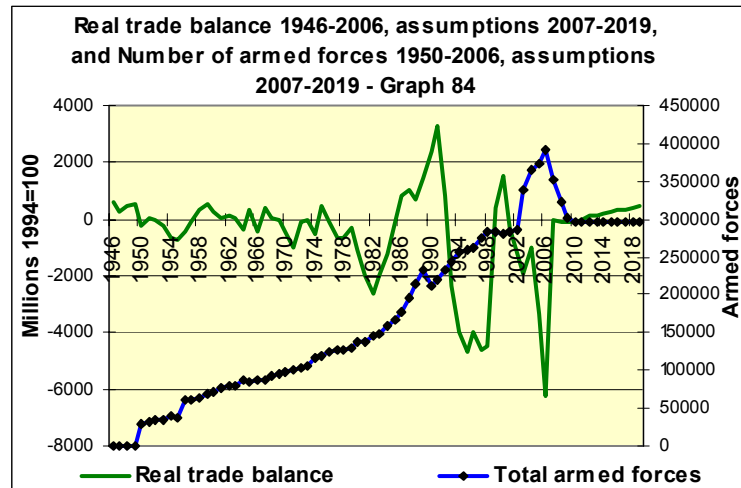
SCENARIO 9A – Increasing social content: Students enrolled growing at 4% annually. **Assumptions**

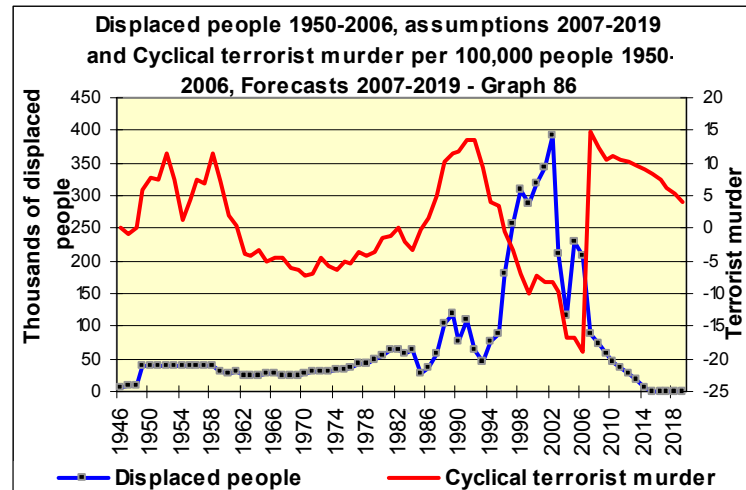
Armed forces diminish in this scenario variably identically as last scenario: 20% in 2007 , 8% on 2008; then remain constant from 2009 to 2011. In 2012 they diminish 20%, and 5% in 2013, in 2014 they remain constant; in 2015 they reduce again by 2% and, from 2016 to 2019 they remain constant at 214,337 men. The real trade balance remains at the same figures of the National Front years; students enrolled growing at 4% annually; displacement follows the assumptions by DNP; unemployment rate falling at 2% annually. As conclusion further reduction in disarmament reduces plus the increase in enrollment reduce National murder, according to this scenario it appears that if we do not want to sacrifice troops we have to pursue further increases in enrollment. National murder reaches 36.9 per capita in 2019. Figures 31 to 32



SCENARIO 10A – Modeling moderate disarmament, 10% in 2007.

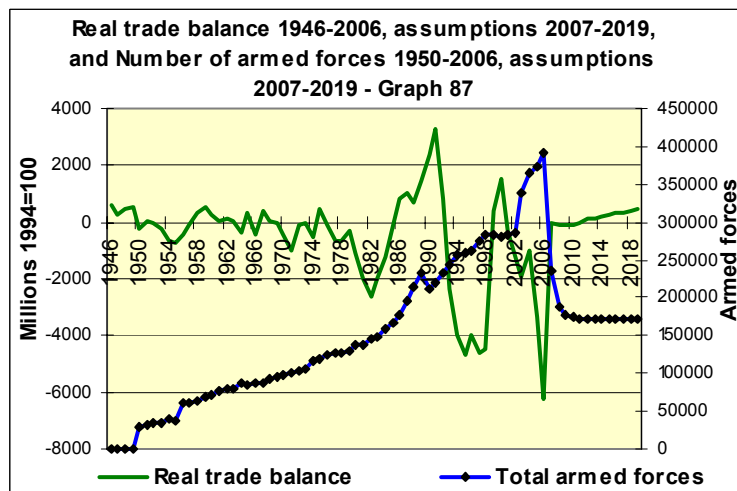
Armed forces decrease by 10% in 2007, 8% in 2008, 7% in 2009, and 2% in 2010; continuous from 2011 to 2019 with 295,381 men. The real trade balance remains at the same figures of the National Front years but from 2012 to 2019 becomes positive ending up in 2019 with 450 millions; students enrolled growing at 4% annually; displacement follows the assumptions by DNP; unemployment rate falling at 2% annually. National murder gets 62.8 per capita in 2019.

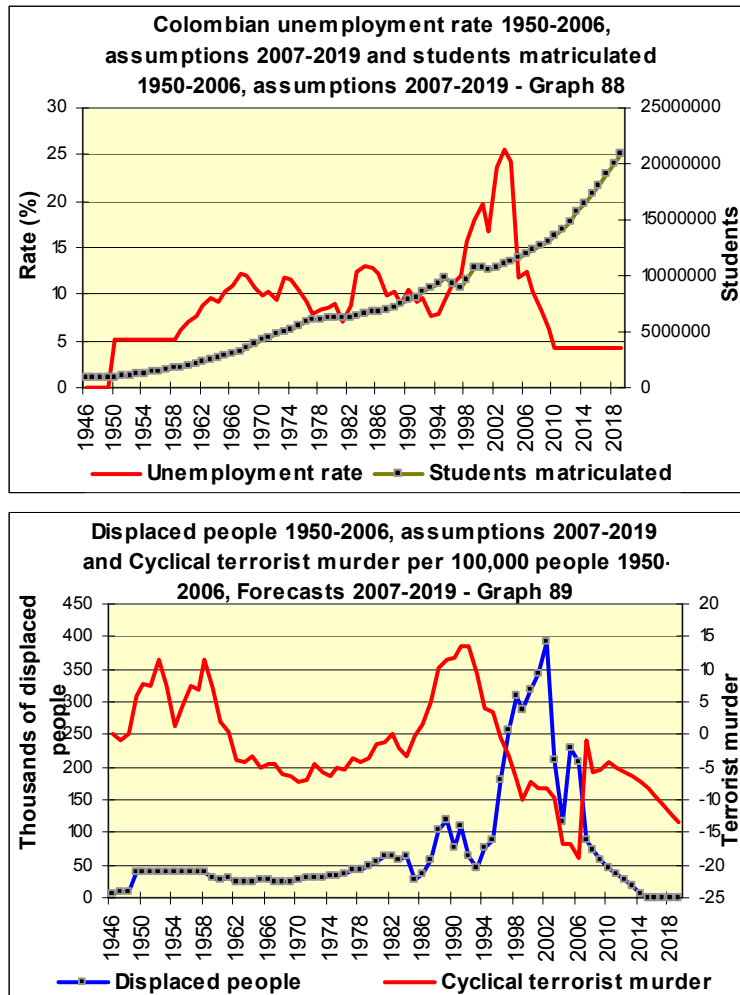




SCENARIO 11A – Increasing social content, students growing at 5% annually, and strong disarmament of 40% in 2007.

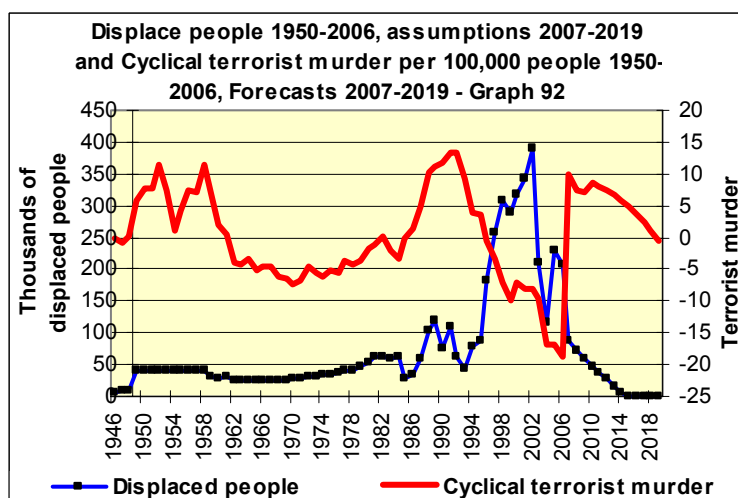
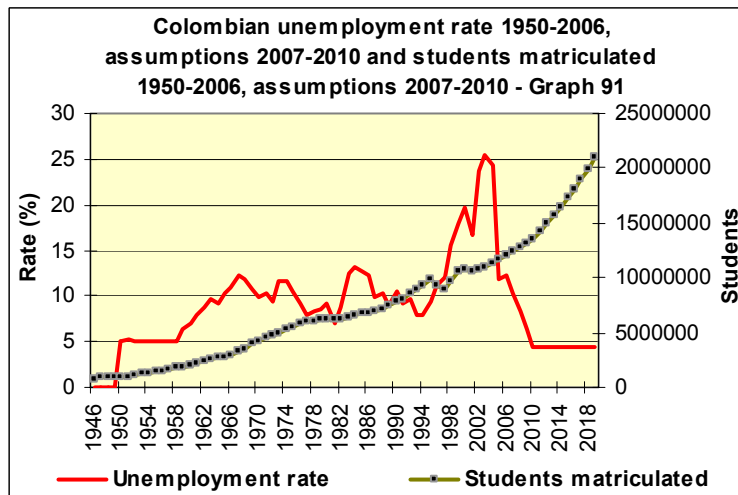
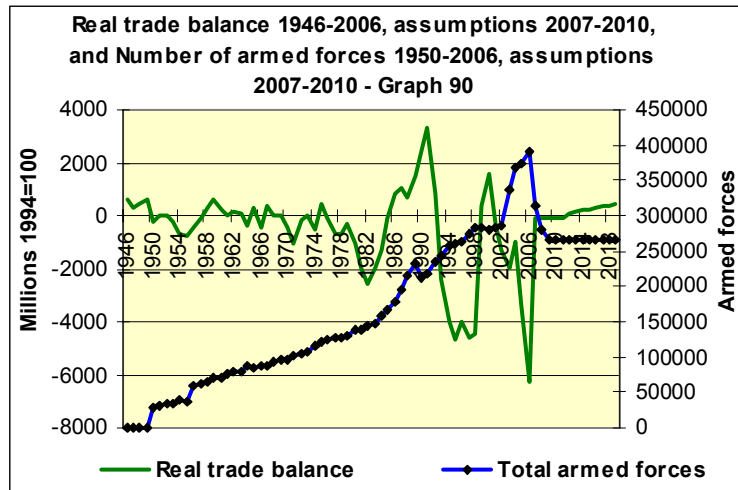
In this scenario, students enrolled are growing at 3% from 2004 to 2010, and at 5% from 2011 to 2019. The armed forces are disarmed at 40% in 2007, 20% in 2008, 5% in 2009, 2% in 2010, and 1% in 2011; from 2012 to 2019 remain constant at 172,982 men. The real trade balance oscillates around negative figures from 2007 to 2010 and becomes positive from 2011 to 2019; displacement follows the assumptions by DNP. As conclusion the policy mixture appears optimal, reducing National murder to 4.8 per capita in 2019. Figures 36 to 38.





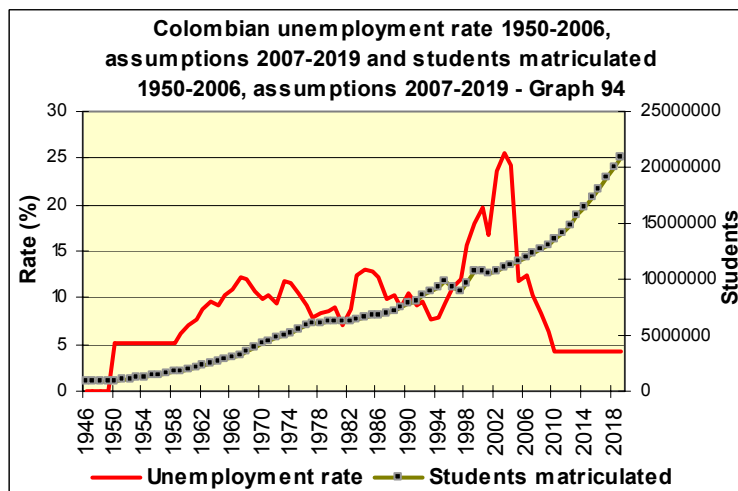
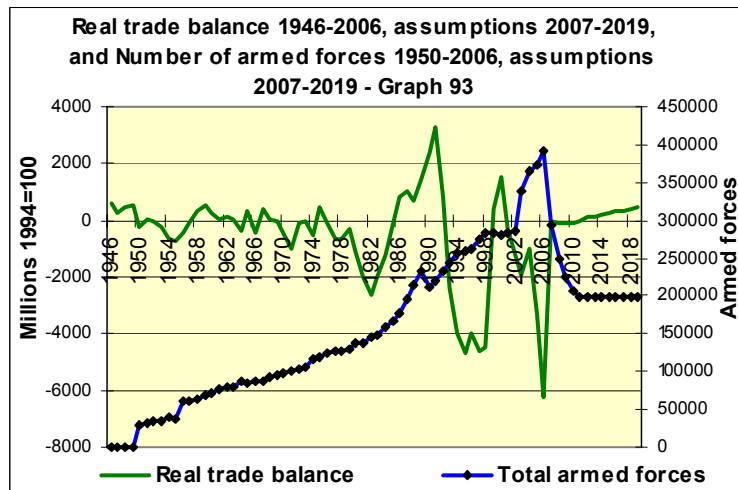
SCENARIO 12A Disarmament. Assumptions

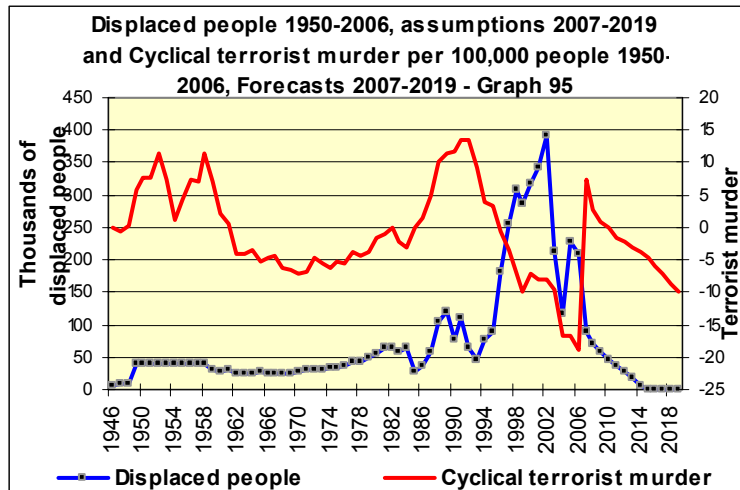
Armed forces diminish 20% in 2007, 10% in 2008, and 5% in 2009; from 2010 to 2019 they remain constant with 267,465 men. Students growing at 3% from 2004 to 2010, and at 5% from 2011 to 2019; the real trade balance oscillates around negative figures from 2007 to 2010 and becomes positive from 2011 to 2019; displacement follows the assumptions by DNP. National murder reaches 48.41 by 2019. Figures 39 to 41



SCENARIO 13A – More than moderate disarmament. Armed forces diminish 25% the first year.

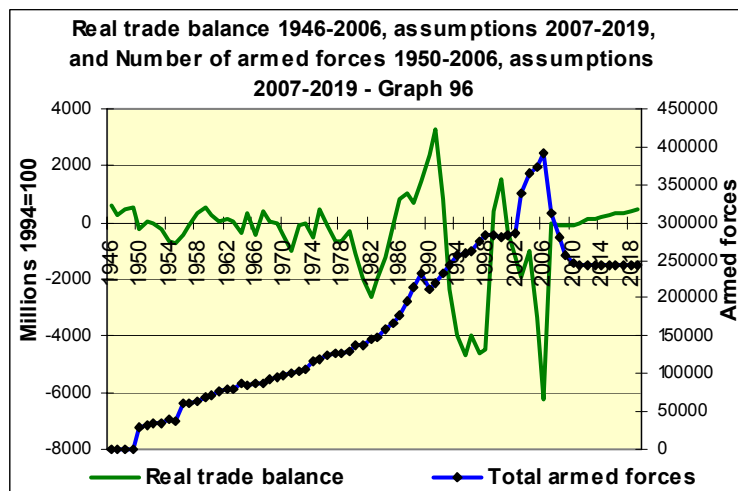
Armed forces diminish 25% in 2007, 15% in 2008, 10% in 2009, 8% on 2010, 4% in 2011, and remains constant from 2012 to 2019 with 198,134 men. Students growing at 3% from 2004 to 2010, and at 5% from 2011 to 2019; the real trade balance oscillates around negative figures from 2006 to 2010 and becomes positive from 2011 to 2019; displacement follows the assumptions by DNP. As conclusion this scenario reduces National murder to 16.4 per capita in 2019 Figures 42 to 44.

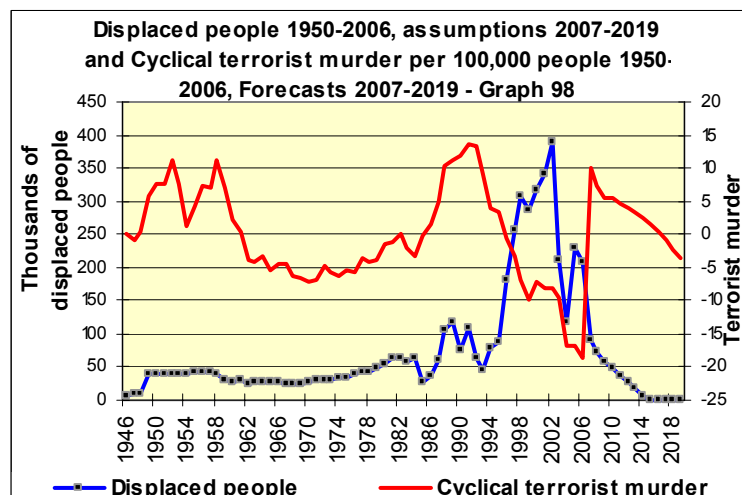
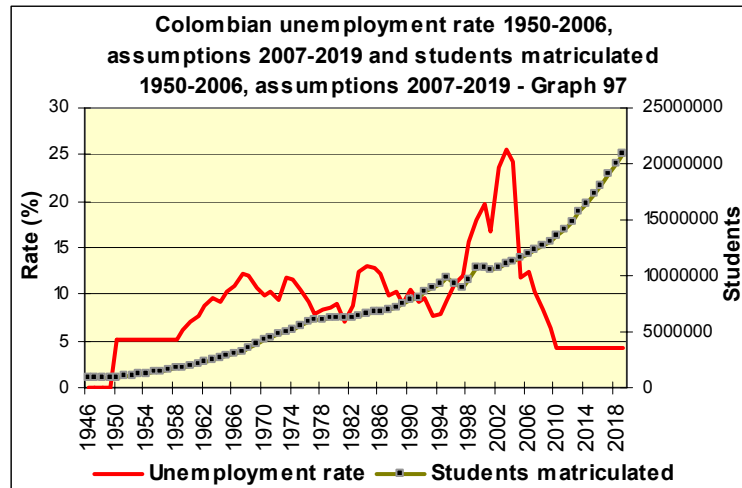




SCENARIO 14A - Disarmament

Armed forces diminish by 20% in 2006, 10% in 2008, 8% in 2009, 4% in 2010, and 1% in 2011; from 2012 to 2019 they remain constant with 243,476 men. Students growing at 3% from 2004 to 2010, and at 5% from 2011 to 2019; the real trade balance oscillates around negative figures from 2007 to 2010, and becomes positive from 2011 to 2019; displacement follows the assumptions by DNP. This scenario reduces National murder to 37.6. Figures 45 to 47.

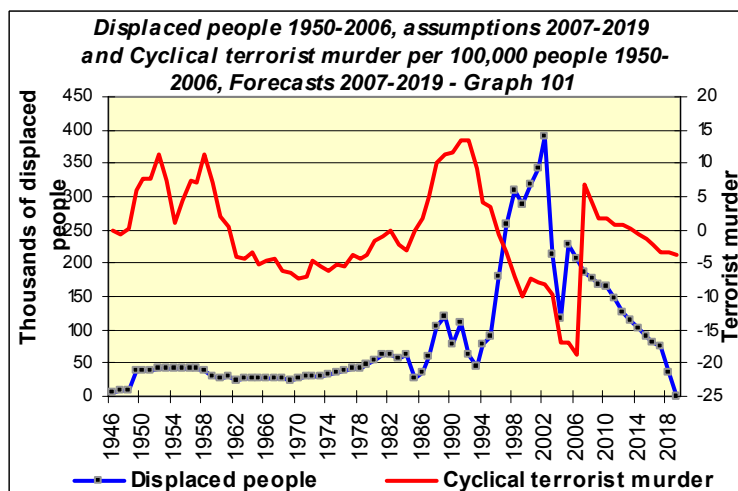
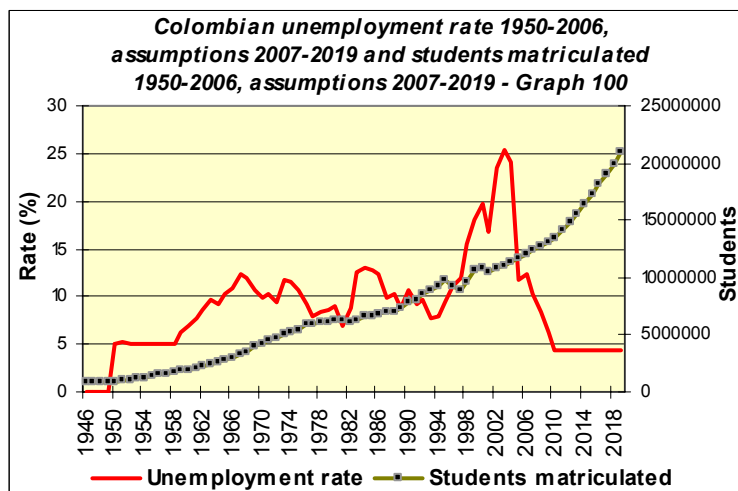
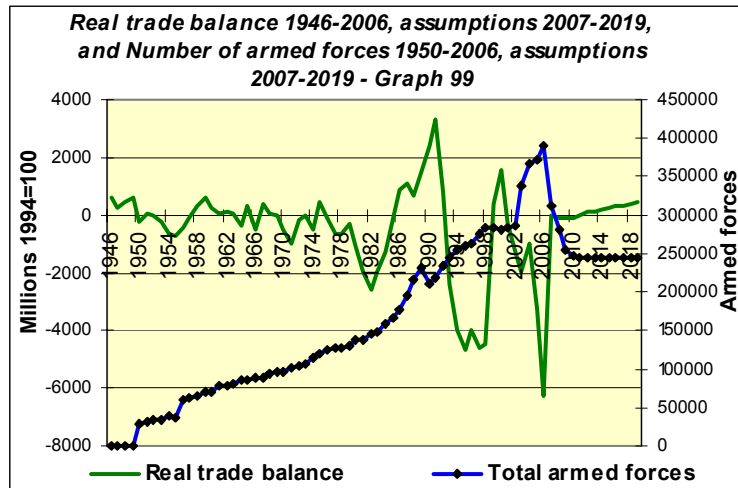




SCENARIO 15A - Pessimistic scenario. The existence of displaced people by year 2018

For didactic purposes I model a slow reduction of displaced people, and its existence up to year 2018. According to this, displaced people diminish 10% in 2007, 6% in 2008, 4% in 2009, 3% in 2010, 10% in 2011, 15% in 2012, 10% in 2013, 10% in 2014, 10% in 2015, 10% in 2016, 10% in 2017, 50% in 2018, and becomes zero in 2019..

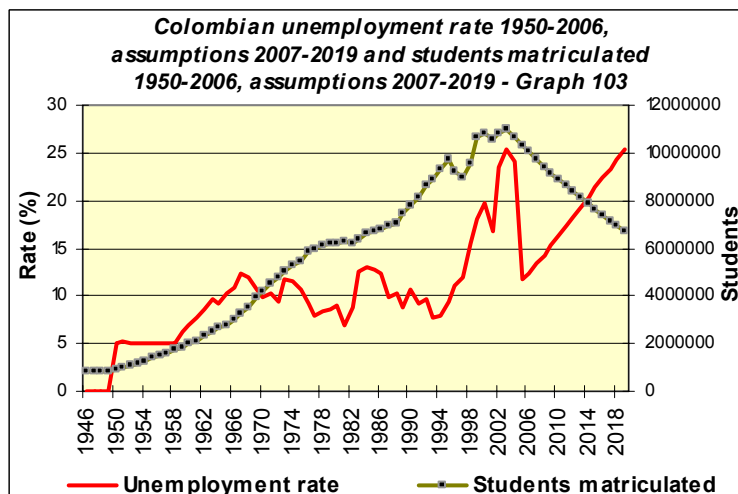
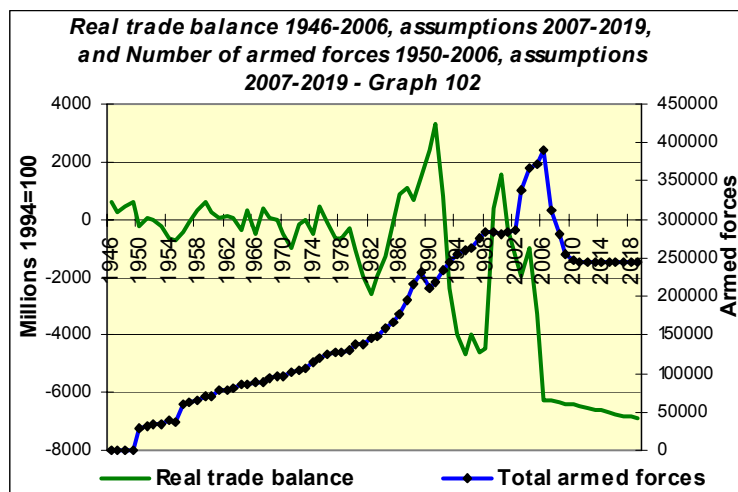
Armed forces also diminish by 20% in 2007, 10% on 2008, 8% on 2009, 4% on 2010, and 1% on 2011, from 2011 to 2019 they remain constant at 243,476. Students growing at 3% from 2004 to 2010, and at 5% from 2011 to 2019; the real trade balance oscillates around negative figures from 2007 to 2010, becoming positive from 2011 to 2019 with 450 millions. National murder gets 37.36 by year 2019. Figures 48 to 50.

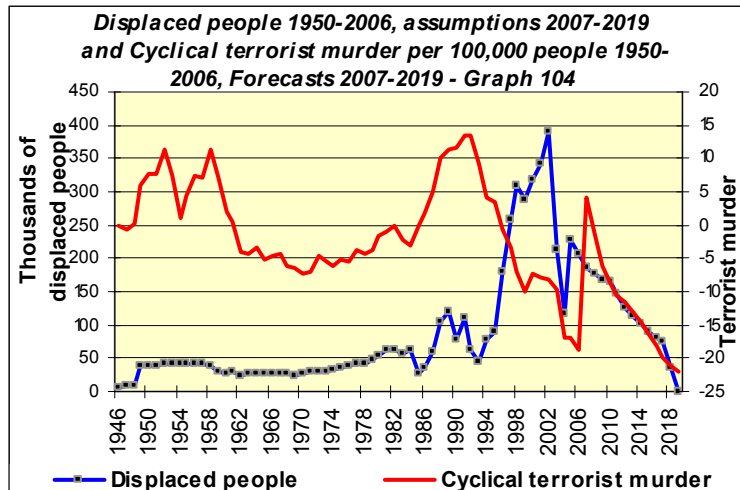


SCENARIO 16A - Pessimistic scenario. High unemployment rate, displacement continues, armed forces increases

I model the assumption of a high unemployment rate up to year 2019, so it becomes 13.35 in 2007, increasing 1% by year getting 25.35 in 2019. Displaced people diminish 10% in 2007, 6% in 2008, 4% in 2009, 3% in 2010, 10% in 2011, 15% in 2012, 10% in 2013, 10% in 2014, 10% in 2014, 15% in 2015, 10% in 2016, 50% in 2018, becoming zero in 2019..

Armed forces also diminish by 20% in 2007, 10% in 2008, 8% in 2009, 4% in 2010, and 1% in 2011. Students growing at 3% from 2004 to 2010, and at 5% from 2011 to 2019; the real trade balance oscillates around negative figures form 2007 to 2010 and becomes positive from 2011 to 2019. The scenario places National murder at 38.51 by year 2019. Figures 51 to 53.

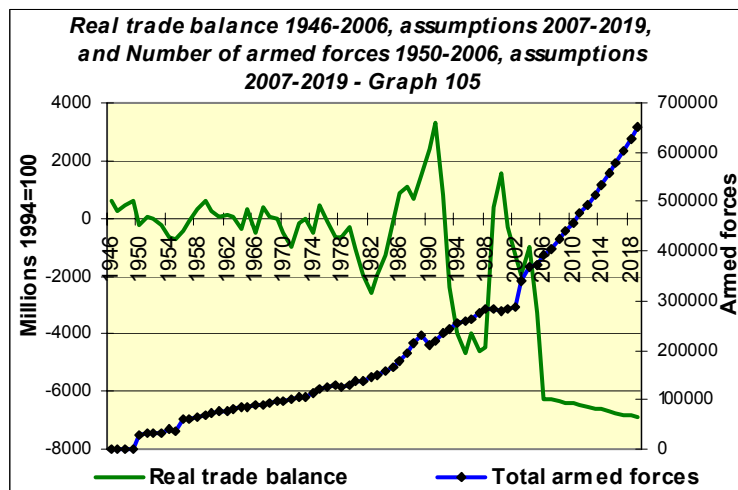


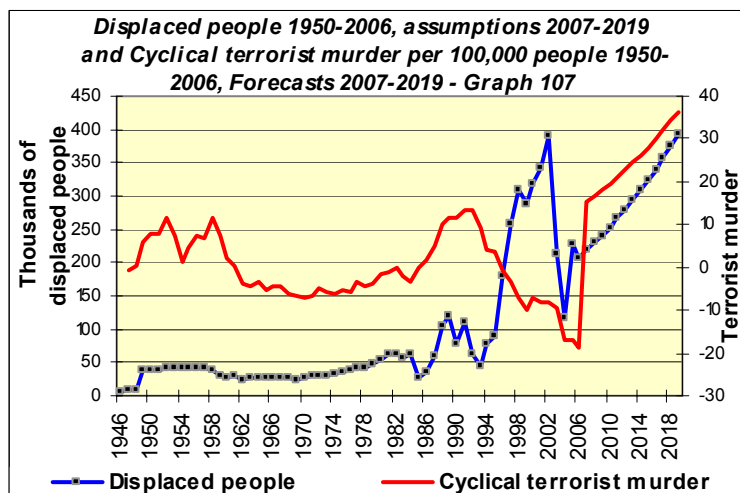
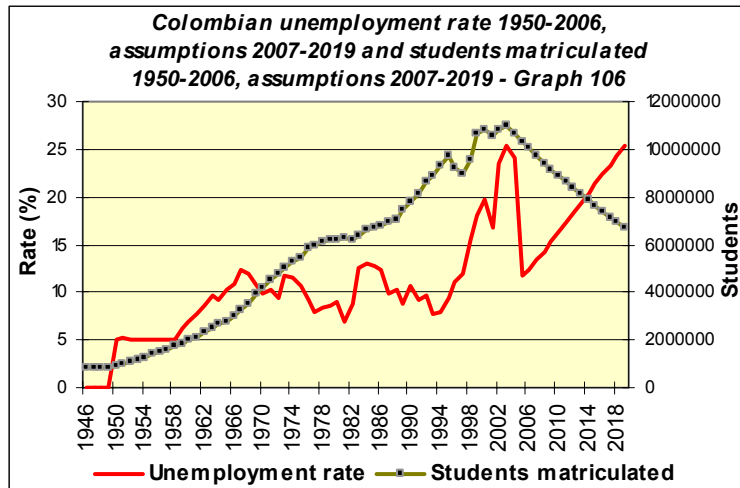


SCENARIO 17A - PESSIMISTIC SCENARIO. A situation where everything shifts for the worst.

In this hypothetical scenario, I assume there is no alternation in power, real trade balance starts deteriorating, students enrolled diminish, armed forces and displaced people continue increasing and the country keeps the high unemployment rate from last scenario.

Real trade balance continues its negative trend from 2007 to 2019, becoming -6,888 this last year, total armed forces increase at 4% annually from 2007 to 2019, displaced people increase at 5% annually from 2007 to 2019, students enrolled diminish at 4% annually from 2004 to 2019. As conclusion National murder jumps to 220.7 by year 2019. Figures 54 to 56.





Conclusion

The concept of Sustainable Peace has been technically defined through the developing of a structural model for National murder, and a model for cyclical terrorist murder. The development of this concept was accomplished after 14 years of uninterrupted research, using advanced econometric techniques. The Scenarios for Sustainable Peace has been re-estimated using these models. The paper has been designed following recommendations from Víctor G. Ricardo Ex-High Commissioner for Peace, Colombia 1999 following his instructions as to the necessity of having an econometric model supporting the design of State Policy for Peace in Colombia.

Acknowledgments

I thank Major Alexander Useche Buitrago from DIJIN for supplying Revista de Criminalidad, Dr. Alicia Arango Olmos Private Secretary Colombian Presidency, Carolina Rentería, Director DNP, and Dr. Mauricio Vargas Vergnaud, Sub-director of Security and Defense DNP. For comments on a draft paper I thank participants at the Cowles Conference on the Econometrics of Strategy and Decision Making, Yale University 2000; Peace Science Conference, Middlesex University, London 2001 and, the First International Conference on: Defense, Security and Economic Development in the Balkans and Eastern Mediterranean, Larissa, Greece, 2001. Many other professionals contributed during the last 14 years, particularly Eugenia Almand from *Margaret Ann Isely Foundation* in Denver, Dr. Manuel Ramírez Gómez, officers of the National Planning Department (DNP), in particular Dr. Amanda Rocío Molina, Dr. Carlos Zarruk Gómez, and Dr. Alvaro Uribe and Eduardo González - Colombian Presidency Office of the High Commissioner for Peace as well as high ranking officers of the Ministry of Defense, both gave me important directions at a colloquiums held in Colombia in 1999. I also thank Regis University, University of Pennsylvania – Jerry Lee Center of Criminology (Dr. Lawrence W. Sherman), Upenn Department of Economics, The Stockholm Criminology Symposium organizers, Dr. Lina Nilsson. Finally I specially thank Reuters United Kingdom and Reuters, Lipper, Denver, Colorado, U.S.

Appendix: data sources

All monetary variables were obtained in nominal terms and converted with the implicit GDP deflator (1994=100). The deflator is obtained for 1946-49 from CEPAL, for 1950-1980 from Banco de la República (Central Bank of Colombia), and for 1981-1999 from Departamento Administrativo Nacional de Estadística (DANE).

Per capita adjustments are made on the basis of total population (millions) counts coming from the censuses of 1953, 1968, 1973, 1978, 1983, 1985, 1993 and projections by DANE.

Nominal social expenses (in millions of Colombian pesos) consist of health expenditures and education expenditures. For 1946-1970, taken from “Estado y Hacienda Pública en Colombia, 1934-1990,” by César Giraldo (Contraloría General de la República); for 1971-1999, taken from financial reports of the General Comptrollers Office of Colombia.

Nominal trade balance data (millions of colombian pesos) is obtained as the difference of exports and imports of goods and services; Banco de la República (Colombian Central Bank), DANE, and calculations by the Departamento Nacional de Planeación (National Planning Department), Macroeconomics Studies Unit. Nominal private consumption (millions of Colombian pesos); Banco de la República, DANE, and calculations by the National Planning Department, Macroeconomic Studies Unit. Nominal government consumption (millions of Colombian pesos); Banco de la República, DANE, and calculations by the National Planning Department, Macroeconomic Studies Unit.

The data for the total number of personnel of the Colombian police (PF) and for the total number of members of the armed forces both come up to year 1989 from the National Planning Department, Justice and Security Unit; from 1999 and projections to 2006 come from the National Ministry of Defense.

The coding for the years of *La Violencia* and the *National Front* years are taken from Bushnell, 1993.

Total homicides are the sum of four murder series: murder (*homicidio*), aggravated murder (*homicidio agravado*), murder with cyclical intent (*homicidio con fin cyclicala*), and death associated with the exercise of official duties (*homicidio con función, razón cargo o ejercicio de sus funciones*). The data are taken from various issues of *Revista Criminalidad*; Colombian National Police. Finally, the cyclical component of total homicides is computed by and reported in Gómez-Sorzano (2005).

The unemployment rate for the period 1950-54 comes from the monthly bulletins of statistics (DANE), for the period 1955-1976 it was taken from Londoño (1990) and, since 1977 it corresponds to the unemployment rate in the four largest Colombian cities (Bogotá, Cali, Medellín and Barranquilla) the source is DANE.

The number of students enrolled in all modalities (pre-elementary, elementary, high school, university) are taken from 1946-1990 from Londoño (1990), for 1987-2002 from the Ministry of National Education and the ICFES (Colombian Institute for the Promotion of Higher Education).

The data for displaced families are taken from *Revista Criminalidad* #45, 2002 p.p. 86-92; and Justice and Security Unit National Planning Department (DNP).

Appendix A. The Beveridge & Nelson decomposition of economic time series applied to decomposing the Colombian per capita homicides from 1946 to 2006

I denote the observations of a stationary series of the logarithm of per capita homicides by $Lthom$ and its first differences by W_t . Following Beveridge– Nelson, BN for short, (1981, p.154), many economic times series require transformation to natural logs before the first differences exhibit stationarity, so the W_t 's, then are continuous rates of change.

$$W_t = Lthom_t - Lthom_{t-1} \quad (1)$$

If the w 's are stationary in the sense of fluctuating around a zero mean with stable autocovariance structure, then the decomposition theorem due to Wold (1938) implies that W_t maybe expressed as

$$W_t = \mu + \lambda_0 \varepsilon_t + \lambda_1 \varepsilon_{t-1} +, \text{ where } \lambda_0 \equiv 1 \quad (2)$$

where, μ the λ 's are constants, and the ε 's are uncorrelated disturbances. According to BN, the expectation of $Lthom_{t+k}$ conditional on data for $Lthom$ through time t is denoted by $\hat{Lthom}(k)$, and is given by

$$\begin{aligned} \hat{Lthom}(k) &= E(Lthom_{t+k} |, Lthom_{t-1}, Lthom_t) \quad (3) \\ &= Lthom_t + E(W_{t+1} + W_{t+k} |, W_{t+1}, W_t) \\ &= Lthom + \hat{W}_t(1) + + \hat{W}_t(k) \end{aligned}$$

Since the Z_t 's can be expressed as accumulations of the W_t 's. Now from (2) it is easy to see that the forecasts of W_{t+i} at time t are

$$\begin{aligned} \hat{W}_t(i) &= \mu + \lambda_i \varepsilon_t + \lambda_{i+1} \varepsilon_{t-1} + \quad (4) \\ &\mu + \sum_{j=1}^{\infty} \lambda_j \varepsilon_{t+1-j} , \end{aligned}$$

Now substituting (4) in (3), and gathering terms in each ε_t , I get

$$\begin{aligned} \hat{Lthom}_t(k) &= Lthom_t + \hat{W}_t(i) \quad (5) \\ &= Lthom_t + \left[\mu + \sum_{j=1}^{\infty} \lambda_j \varepsilon_{t+1-j} \right] \\ &= k\mu + Lthom_t + \left(\sum_1^k \lambda_i \right) \varepsilon_t + \left(\sum_2^{k+1} \lambda_i \right) \varepsilon_{t-1} + \end{aligned}$$

And considering long forecasts, I approximately have

$$\hat{Lhom}_t(k) \cong k\mu + Lhom_t + \left(\sum_1^{\infty} \lambda_i \right) \varepsilon_t + \left(\sum_2^{\infty} \lambda_i \right) \varepsilon_{t-1} + \quad (6)$$

According to (6), it is clearly seen that the forecasts of homicide in period (k) is asymptotic to a linear function with slope equal to μ (constant), and a level $Lhom_t$ (intercept or first value of the series).

Denoting this level by $\overline{Lhom_t}$ I have

$$\overline{Lhom_t} = Lhom_t + \left(\sum_1^{\infty} \lambda_i \right) \varepsilon_t + \left(\sum_2^{\infty} \lambda_i \right) \varepsilon_{t-1} + \quad (7)$$

The unknown μ and λ 's in Eq. (6) must be estimated. Beveridge and Nelson suggest and ARIMA procedure of order (p,1,q) with drift μ .

$$W_t = \mu + \frac{(1 - \theta_1 L^1 - . . . - \theta_q L^q)}{(1 - \phi_1 L^1 - . . . - \phi_p L^p)} \varepsilon_t = \mu + \frac{\theta(L)}{\phi(L)} \varepsilon_t \quad (8)$$

Cuddington and Winters (1987, p.22, Eq. 7) realized that in the steady state, i.e., $L=1$, Eq. (9) converts to

$$\overline{Lhom_t} - \overline{Lhom_{t-1}} = \mu + \frac{(1 - \theta_1 - . . . - \theta_q)}{(1 - \phi_1 - . . . - \phi_p)} \varepsilon_t = \mu + \frac{\theta(1)}{\phi(1)} \varepsilon_t \quad (9)$$

The next step requires replacing the parameters of the ARIMA model (Table 6) and iterating Eq.(9) recursively, i.e., replace t by (t-1), and (t-1) by (t-2), etc, I get

$$W_t = \overline{Lhom_t} - \overline{Lhom_{t-1}} = \mu + \frac{\theta(1)}{\phi(1)} \varepsilon_t \quad (10)$$

$$W_{t-1} = \overline{Lhom_{t-1}} - \overline{Lhom_{t-2}} = \mu + \frac{\theta(1)}{\phi(1)} \varepsilon_{t-1}$$

:

$$W_1 = \overline{Lhom_1} - \overline{Lhom_0} = \mu + \frac{\theta(1)}{\phi(1)} \varepsilon_1 \quad (this is the value for year 1947)$$

:

$$W_{60} = \overline{Lhom_{82}} - \overline{Lhom_0} = \mu + \frac{\theta(1)}{\phi(1)} \varepsilon_2 \quad (this is the value for year 2006)$$

Adding these equations I obtain W_1 (the value for year 1947), and W_{60} (the value for year 2006), on the right hand side μ is added “t” times, and the fraction following μ is a constant multiplied by the sum of error terms. I obtain

$$\overline{L \text{ hom}_t} = \overline{L \text{ hom}_0} + \mu t + \frac{\theta(1)}{\phi(1)} \sum_{i=1}^t \varepsilon_i \quad (11)$$

This is, Newbold’s (1990, 457, Eq.(6), which is a differential equations that solves after replacing the initial value for $\overline{L \text{ hom}_0}$, which is the logarithm of per capita murder in year 1923.

Cárdenas (1991), suggests that Eq.(11), should be changed when the ARIMA model includes autoregressive components. Since the ARIMA developed for the U.S’ case (Table 2), includes autoregressive, and moving average components, I formally show this now.

$$L \text{ hom}_t - L \text{ hom}_{t-1} = \mu + \sum_{i=1}^p \phi_i W_{t-i} + \sum_{j=1}^q \theta_j \varepsilon_{t-j} + \varepsilon_t \quad (12)$$

$$\Delta L \text{ hom}_t = W_t = L t \text{ hom}_t - L t \text{ hom}_{t-1}$$

$$L \text{ hom}_t - L \text{ hom}_{t-1} = \mu + \sum_{i=1}^p \phi_i \Delta L \text{ hom}_{t-i} + \sum_{j=1}^q \theta_j \varepsilon_{t-j} + \varepsilon_t$$

Bringing the moving average components to the LHS, I get

$$L \text{ hom}_t - L \text{ hom}_{t-1} - \left(\sum_{i=1}^p \phi_i \Delta L \text{ hom}_{t-i} \right) = \mu + \sum_{j=1}^q \theta_j \varepsilon_{t-j} + \varepsilon_t \quad (13)$$

Expanding summation terms

$$(1 - \phi_1 L^1 - \phi_2 L^2 - \dots - \phi_p L^p)(L \text{ hom}_t - L \text{ hom}_{t-1}) = \mu + (1 + \theta_1 L^1 + \dots + \theta_q L^q) \varepsilon_t \quad (14)$$

For the Colombian case, Arima model from table 6, does not include autoregressive components, so equation (14) becomes,

$$(L \text{ hom}_t - L \text{ hom}_{t-1}) = \mu + (1 + \theta_1 L^1 + \dots + \theta_q L^q) \varepsilon_t \quad (14A)$$

And after replacing parameters, I get the following equation,

$$(L \text{ hom}_t - L \text{ hom}_{t-1}) = 0.0220 + (1 + 0.2729 - 0.2701 - 0.2744) \varepsilon_t \quad (14B)$$

Equation (14B) yields the permanent component of the per capita murder for Colombia; the last step requires taking the exponential to the LHS of 14B, getting the level for the permanent component. The cyclical component is finally obtained by the difference of the level of the observed per capita murder minus the level of the permanent component of murder, and is shown respectively on figures 1A and 1B.

Appendix B – Scenarios 2007 – 2019 – A MODEL FOR NATIONAL MURDER

Table 1

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	12	11210917	229.3	39.88
2006	0	1	-6238	391004	12	11323026	208.2	37.90
2007	0	1	-5738	394672	11	11539371	89.6	113.92
2008	0	1	-5238	398618	10	11654764	72.4	118.71
2009	0	1	-4738	402604	9	11771311	58.5	123.47
2010	0	1	-4238	406630	8	11889024	47.3	128.21
2011	0	1	-3738	386298	7	12007914	37.3	121.70
2012	0	1	-3238	366983	6	12127993	27.3	115.65
2013	0	1	-2738	348634	5	12249272	17.3	110.04
2014	0	1	-2238	331202	5	12371764	7.3	103.57
2015	0	1	-1738	314642	5	12495481	0	96.77
2016	0	1	-1238	298910	5	12620435	0	90.25
2017	0	1	-738	283964	5	12746639	0	84.08
2018	0	1	-238	269766	5	12874105	0	78.25
2019	0	1	262	256278	5	13002846	0	72.75

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Table 2

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	12	11210917	229.3	39.88
2006	0	1	-6238	391004	12	11323026	208.2	37.90
2007	0	1	-5738	374938.4	11	11539371	89.6	104.82
2008	0	1	-5238	356191.5	10	11654764	72.4	99.15
2009	0	1	-4738	338381.9	9	11771311	58.5	93.87
2010	0	1	-4238	321462.8	8	11889024	47.3	88.95
2011	0	1	-3738	305389.7	7	12007914	37.3	84.40
2012	0	1	-3238	290120.2	6	12127993	27.3	80.21
2013	0	1	-2738	275614.2	5	12249272	17.3	76.37
2014	0	1	-2238	261833.5	5	12371764	7.3	71.59
2015	0	1	-1738	248741.8	5	12495481	0	66.39
2016	0	1	-1238	236304.7	5	12620435	0	61.38
2017	0	1	-738	224489.5	5	12746639	0	56.66
2018	0	1	-238	213265	5	12874105	0	52.20
2019	0	1	262	202601.7	5	13002846	0	48.00

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Tabla 3

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	12	11210917	229.3	39.88
2006	0	1	-6238	391004	12	11323026	208.2	37.90
2007	0	1	-5738	374938.4	9	11539371	89.6	108.74
2008	0	1	-5638	338381.9	8	11654764	72.4	93.89
2009	0	1	-5538	324846.6	7	11771311	58.5	89.60
2010	0	1	-5438	311852.8	6	11889024	47.3	85.52
2011	0	1	-5338	299378.7	5	12007914	37.3	81.65
2012	0	1	-5238	287403.5	4	12127993	27.3	78.01
2013	0	1	-5138	278781.4	3	12249272	17.3	75.91
2014	0	1	-5038	270418	3	12371764	7.3	72.65
2015	0	1	-4938	262305.4	3	12495481	0	68.78
2016	0	1	-4838	257059.3	3	12620435	0	66.11
2017	0	1	-4738	251918.1	3	12746639	0	63.49
2018	0	1	-4638	246879.8	3	12874105	0	60.91
2019	0	1	-4538	241942.2	3	13002846	0	58.38

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Table 4

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	12	11659309	229.3	39.88
2006	0	1	-6238	391004	12	12009088	208.2	37.90
2007	0	1	-5738	371453	10	12369360	89.6	101.92
2008	0	1	-5638	352880	8	12740440	72.4	96.32
2009	0	1	-5538	338764	6	13122653	58.5	92.69
2010	0	1	-5438	325213	4	13516332	47.3	89.23
2011	0	1	-5338	312204	4	13921821	37.3	82.03
2012	0	1	-5238	299715	4	14339475	27.3	75.02
2013	0	1	-5138	290723	4	14769659	17.3	69.58
2014	0	1	-5038	282001	4	15212748	7.3	64.21
2015	0	1	-4938	273540	4	15669130	0	58.87
2016	0	1	-4838	268069	4	16139203	0	54.75
2017	0	1	-4738	262707	4	16623379	0	50.63
2018	0	1	-4638	257452	4	17122080	0	46.49
2019	0	1	-4538	252302	4	17635742	0	42.35

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Table 5

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	12	11210917	229.3	39.88
2006	0	1	-6238	391004	12	11323026	208.2	37.90
2007	0	1	-6138	367543	9	11885552.13	89.6	103.00
2008	0	1	-6038	345490	8	12242118.69	72.4	93.90
2009	0	1	-5938	328215	7	12609382.25	58.5	86.90
2010	0	1	-5838	311804	6	12987663.72	47.3	80.22
2011	0	1	-5738	296213	5	13377293.63	37.3	73.86
2012	0	1	-5638	281402	4	13778612.44	27.3	67.81
2013	0	1	-5538	270145	3	14191970.82	17.3	63.35
2014	0	1	-5438	259339	3	14617729.94	7.3	57.77
2015	0	1	-5338	248965	3	15056261.84	0	51.62
2016	0	1	-5238	248965	3	15507949.69	0	50.09
2017	0	1	-5138	248965	3	15973188.19	0	48.52
2018	0	1	-5038	248965	3	16452383.83	0	46.88
2019	0	1	-4938	248965	3	16945955.35	0	45.19

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Table 6

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	12	11659309	229.3	39.88
2006	0	1	-6238	391004	12	12009088	208.2	37.90
2007	0	1	-54	414464	10	12369360	89.6	135.59
2008	0	1	-64	439332	8	12740440	72.4	149.75
2009	0	1	-70	461298	6	13122653	58.5	162.49
2010	0	1	-59	484363	4	13516332	47.3	175.69
2011	0	1	-38	508581	4	13921821	37.3	185.47
2012	0	1	100	534010	4	14339475	27.3	196.03
2013	0	1	150	555371	4	14769659	17.3	204.46
2014	0	1	200	577586	4	15212748	7.3	213.23
2015	0	1	250	600689	4	15669130	0	222.32
2016	0	1	300	600689	4	16139203	0	220.60
2017	0	1	350	600689	4	16623379	0	218.83
2018	0	1	400	600689	4	17122080	0	217.00
2019	0	1	450	600689	4	17635742	0	215.11

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Table 7

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	12	11659309	229.3	39.88
2006	0	1	-6238	391004	12	12009088	208.2	37.90
2007	0	1	-54	371453	10	12369360	89.6	115.76
2008	0	1	-64	356594	8	12740440	72.4	111.61
2009	0	1	-70	345896	6	13122653	58.5	109.29
2010	0	1	-59	338978	4	13516332	47.3	108.67
2011	0	1	-38	335588	4	13921821	37.3	105.71
2012	0	1	100	328876	4	14339475	27.3	101.46
2013	0	1	150	322298	4	14769659	17.3	97.01
2014	0	1	200	306183	4	15212748	7.3	88.11
2015	0	1	250	287812	4	15669130	0	78.08
2016	0	1	300	259030	4	16139203	0	63.09
2017	0	1	350	235717	4	16623379	0	50.57
2018	0	1	400	235717	4	17122080	0	48.74
2019	0	1	450	235717	4	17635742	0	46.85

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Table 8

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	12	11659309	229.3	39.88
2006	0	1	-6238	391004	12	12009088	208.2	37.90
2007	0	1	-54	312803	10	12369360	89.6	88.72
2008	0	1	-64	287778	8	12740440	72.4	79.88
2009	0	1	-70	287778	6	13122653	58.5	82.49
2010	0	1	-59	287778	4	13516332	47.3	85.06
2011	0	1	-38	287778	4	13921821	37.3	83.67
2012	0	1	100	230224	4	14339475	27.3	55.98
2013	0	1	150	218712	4	14769659	17.3	49.26
2014	0	1	200	218712	4	15212748	7.3	47.79
2015	0	1	250	214337	4	15669130	0	44.21
2016	0	1	300	214337	4	16139203	0	42.49
2017	0	1	350	214337	4	16623379	0	40.71
2018	0	1	400	214337	4	17122080	0	38.88
2019	0	1	450	214337	4	17635742	0	36.99

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Table 9

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	12	11886802	229.3	39.88
2006	0	1	-6238	391004	12	12362274	208.2	37.90
2007	0	1	-54	312803	10	12856764	89.6	86.81
2008	0	1	-64	287778	8	13371034	72.4	77.41
2009	0	1	-70	287778	6	13905875	58.5	79.43
2010	0	1	-59	287778	4	14462110	47.3	81.36
2011	0	1	-38	287778	4	15040594	37.3	79.29
2012	0	1	100	230224	4	15642217	27.3	50.88
2013	0	1	150	218712	4	16267905	17.3	43.39
2014	0	1	200	218712	4	16918621	7.3	41.10
2015	0	1	250	214337	4	17595365	0	36.66
2016	0	1	300	214337	4	18299179	0	34.03
2017	0	1	350	214337	4	19031146	0	31.28
2018	0	1	400	214337	4	19792391	0	28.42
2019	0	1	450	214337	4	20584082	0	25.44

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Table 10

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	12	11886802	229.3	39.88
2006	0	1	-6238	391004	12	12362274	208.2	37.90
2007	0	1	-54	351903	10	12856764	89.6	104.84
2008	0	1	-64	323750	8	13371034	72.4	93.99
2009	0	1	-70	301410	6	13905875	58.5	85.71
2010	0	1	-59	295381	4	14462110	47.3	84.86
2011	0	1	-38	295381	4	15040594	37.3	82.79
2012	0	1	100	295381	4	15642217	27.3	80.92
2013	0	1	150	295381	4	16267905	17.3	78.73
2014	0	1	200	295381	4	16918621	7.3	76.45
2015	0	1	250	295381	4	17595365	0	74.03
2016	0	1	300	295381	4	18299179	0	71.39
2017	0	1	350	295381	4	19031146	0	68.64
2018	0	1	400	295381	4	19792391	0	65.78
2019	0	1	450	295381	4	20584082	0	62.80

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Table 11

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	11.8	11659309	229.3	39.88
2006	0	1	-6238	391004	12.35	12009088	208.2	37.90
2007	0	1	-54	234602	10.35	12369360	89.6	52.67
2008	0	1	-64	187681	8.35	12740440	72.4	33.73
2009	0	1	-70	178296	6.35	13122653	58.5	32.02
2010	0	1	-59	174730	4.35	13516332	47.3	32.95
2011	0	1	-38	172982	4.35	14192148	37.3	29.69
2012	0	1	100	172982	4.35	14901755	27.3	27.39
2013	0	1	150	172982	4.35	15646842	17.3	24.74
2014	0	1	200	172982	4.35	16429184	7.3	21.94
2015	0	1	250	172982	4.35	17250643	0	18.95
2016	0	1	300	172982	4.35	18113175	0	15.69
2017	0	1	350	172982	4.35	19018833	0	12.26
2018	0	1	400	172982	4.35	19969774	0	8.66
2019	0	1	450	172982	4.35	20968262	0	4.87

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Table 12

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	11.8	11659309	229.3	39.88
2006	0	1	-6238	391004	12.35	12009088	208.2	37.90
2007	0	1	-54	312803	10.35	12369360	89.6	88.72
2008	0	1	-64	281522	8.35	12740440	72.4	77.00
2009	0	1	-70	267445	6.35	13122653	58.5	73.12
2010	0	1	-59	267445	4.35	13516332	47.3	75.69
2011	0	1	-38	267445	4.35	14192148	37.3	73.24
2012	0	1	100	267445	4.35	14901755	27.3	70.94
2013	0	1	150	267445	4.35	15646842	17.3	68.29
2014	0	1	200	267445	4.35	16429184	7.3	65.49
2015	0	1	250	267445	4.35	17250643	0	62.50
2016	0	1	300	267445	4.35	18113175	0	59.24
2017	0	1	350	267445	4.35	19018833	0	55.81
2018	0	1	400	267445	4.35	19969774	0	52.21
2019	0	1	450	267445	4.35	20968262	0	48.42

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Table 13

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	11.8	11659309	229.3	39.88
2006	0	1	-6238	391004	12.35	12009088	208.2	37.90
2007	0	1	-54	293253	10.35	12369360	89.6	79.71
2008	0	1	-64	249265	8.35	12740440	72.4	62.13
2009	0	1	-70	224338	6.35	13122653	58.5	53.25
2010	0	1	-59	206390	4.35	13516332	47.3	47.54
2011	0	1	-38	198134	4.35	14192148	37.3	41.29
2012	0	1	100	198134	4.35	14901755	27.3	38.99
2013	0	1	150	198134	4.35	15646842	17.3	36.33
2014	0	1	200	198134	4.35	16429184	7.3	33.54
2015	0	1	250	198134	4.35	17250643	0	30.54
2016	0	1	300	198134	4.35	18113175	0	27.29
2017	0	1	350	198134	4.35	19018833	0	23.86
2018	0	1	400	198134	4.35	19969774	0	20.26
2019	0	1	450	198134	4.35	20968262	0	16.47

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Table 14

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	11.8	11659309	229.3	39.88
2006	0	1	-6238	391004	12.35	12009088	208.2	37.90
2007	0	1	-54	312803	10.35	12369360	89.6	88.72
2008	0	1	-64	281522	8.35	12740440	72.4	77.00
2009	0	1	-70	256184	6.35	13122653	58.5	67.93
2010	0	1	-59	245936	4.35	13516332	47.3	65.77
2011	0	1	-38	243476	4.35	14192148	37.3	62.19
2012	0	1	100	243476	4.35	14901755	27.3	59.89
2013	0	1	150	243476	4.35	15646842	17.3	57.24
2014	0	1	200	243476	4.35	16429184	7.3	54.44
2015	0	1	250	243476	4.35	17250643	0	51.45
2016	0	1	300	243476	4.35	18113175	0	48.19
2017	0	1	350	243476	4.35	19018833	0	44.76
2018	0	1	400	243476	4.35	19969774	0	41.16
2019	0	1	450	243476	4.35	20968262	0	37.37

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Table 15

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	11.8	11659309	229.3	39.88
2006	0	1	-6238	391004	12.35	12009088	208.2	37.90
2007	0	1	-54	312803	10.35	12369360	187.38	87.31
2008	0	1	-64	281522	8.35	12740440	176.13	75.49
2009	0	1	-70	256184	6.35	13122653	169.08	66.33
2010	0	1	-59	245936	4.35	13516332	164	64.08
2011	0	1	-38	243476	4.35	14192148	147.6	60.59
2012	0	1	100	243476	4.35	14901755	125.46	58.47
2013	0	1	150	243476	4.35	15646842	112.91	55.85
2014	0	1	200	243476	4.35	16429184	101.6	53.07
2015	0	1	250	243476	4.35	17250643	91.43	50.12
2016	0	1	300	243476	4.35	18113175	82.28	47.00
2017	0	1	350	243476	4.35	19018833	74.05	43.69
2018	0	1	400	243476	4.35	19969774	37	40.62
2019	0	1	450	243476	4.35	20968262	0	37.37

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Table 16

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	11.8	10340509	229.3	39.88
2006	0	1	-6238	391004	12.35	10030294	208.2	37.90
2007	0	1	-6288	312803	13.35	9729386	187.38	81.09
2008	0	1	-6338	281522	14.35	9437504	176.13	65.90
2009	0	1	-6388	256184	15.35	9154378	169.08	53.34
2010	0	1	-6438	245936	16.35	8879746	164	47.68
2011	0	1	-6488	243476	17.35	8613353	147.6	45.75
2012	0	1	-6538	243476	18.35	8354952	125.46	45.00
2013	0	1	-6588	243476	19.35	8104303	112.91	44.08
2014	0	1	-6638	243476	20.35	7861117	101.6	43.11
2015	0	1	-6688	243476	21.35	7625281	91.43	42.10
2016	0	1	-6738	243476	22.35	7396522	82.28	41.04
2017	0	1	-6788	243476	23.35	7174626	74.05	39.95
2018	0	1	-6838	243476	24.35	6959387	37	39.24
2019	0	1	-6888	243476	25.35	6750605	0	38.51

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Table 17

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	THOMPC
2005	0	1	-3308	372611	12	10340509	229.3	39.88
2006	0	1	-6238	391004	12	10030294	208.2	37.90
2007	0	1	-6288	406644	13	9729386	218.61	123.90
2008	0	1	-6338	422909	14	9437504	229.54	130.30
2009	0	1	-6388	439826	15	9154378	241	136.96
2010	0	1	-6438	457419	16	8879746	253	143.89
2011	0	1	-6488	475716	17	8613353	265.72	151.10
2012	0	1	-6538	494744	18	8354952	279	158.61
2013	0	1	-6588	514534	19	8104303	292.95	166.43
2014	0	1	-6638	535115	20	7861117	307.6	174.57
2015	0	1	-6688	556520	21	7625281	322.9	183.06
2016	0	1	-6738	578781	22	7396522	339.13	191.90
2017	0	1	-6788	601932	23	7174626	356	201.12
2018	0	1	-6838	626009	24	6959387	373.89	210.72
2019	0	1	-6888	651050	25	6750605	392.59	220.72

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands). Thompc: National murder per 100,000

Appendix B – Scenarios 2007 – 2019 – A MODEL FOR CYCLICAL TERRORIST MURDER

Table 1A

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	372611	12	11210917	229.3	-16.80
2006	0	1	-6238	391004	12	11323026	208.2	-18.77
2007	0	1	-5738	394672	11	11539371	89.6	14.50
2008	0	1	-5238	398618	10	11654764	72.4	16.97
2009	0	1	-4738	402604	9	11771311	58.5	19.32
2010	0	1	-4238	406630	8	11889024	47.3	21.58
2011	0	1	-3738	386298	7	12007914	37.3	20.42
2012	0	1	-3238	366983	6	12127993	27.3	19.39
2013	0	1	-2738	348634	5	12249272	17.3	18.50
2014	0	1	-2238	331202	5	12371764	7.3	17.17
2015	0	1	-1738	314642	5	12495481	0	15.55
2016	0	1	-1238	298910	5	12620435	0	13.81
2017	0	1	-738	283964	5	12746639	0	12.18
2018	0	1	-238	269766	5	12874105	0	10.64
2019	0	1	262	256278	5	13002846	0	9.21

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands).

CVPC1B: Cyclical terrorist murder index

Table 2A

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	-3308	12	11210917	229.3	-16.80
2006	0	1	-6238	-6238	12	11323026	208.2	-18.77
2007	0	1	-5738	-5738	11	11539371	89.6	11.77
2008	0	1	-5238	-5238	10	11654764	72.4	11.07
2009	0	1	-4738	-4738	9	11771311	58.5	10.39
2010	0	1	-4238	-4238	8	11889024	47.3	9.75
2011	0	1	-3738	-3738	7	12007914	37.3	9.17
2012	0	1	-3238	-3238	6	12127993	27.3	8.71
2013	0	1	-2738	-2738	5	12249272	17.3	8.36
2014	0	1	-2238	-2238	5	12371764	7.3	7.53
2015	0	1	-1738	-1738	5	12495481	0	6.40
2016	0	1	-1238	-1238	5	12620435	0	5.11
2017	0	1	-738	-738	5	12746639	0	3.91
2018	0	1	-238	-238	5	12874105	0	2.79
2019	0	1	262	262	5	13002846	0	1.75

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands).

CVPC1B: Cyclical terrorist murder index

Tabla 3A

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	372611	12	11210917	229.3	-16.80
2006	0	1	-6238	391004	12	11323026	208.2	-18.77
2007	0	1	-5738	374938.4	9	11539371	89.6	13.52
2008	0	1	-5638	338381.9	8	11654764	72.4	9.85
2009	0	1	-5538	324846.6	7	11771311	58.5	9.26
2010	0	1	-5438	311852.8	6	11889024	47.3	8.65
2011	0	1	-5338	299378.7	5	12007914	37.3	8.07
2012	0	1	-5238	287403.5	4	12127993	27.3	7.57
2013	0	1	-5138	278781.4	3	12249272	17.3	7.52
2014	0	1	-5038	270418	3	12371764	7.3	6.94
2015	0	1	-4938	262305.4	3	12495481	0	6.00
2016	0	1	-4838	257059.3	3	12620435	0	5.21
2017	0	1	-4738	251918.1	3	12746639	0	4.43
2018	0	1	-4638	246879.8	3	12874105	0	3.67
2019	0	1	-4538	241942.2	3	13002846	0	2.92

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance (millions of pesos 1994). TAF99: Total armed forces (Police+Army)
 U9: Unemployment rate, Students9: Students enrolled in all modalities
 Despla99 : Displaced people (thousands).
 CVPC1B: Cyclical terrorist murder index

Table 4A

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	372611	12	11659309	229.3	-16.80
2006	0	1	-6238	391004	12	12009088	208.2	-18.77
2007	0	1	-5738	371453	10	12369360	89.6	10.92
2008	0	1	-5638	352880	8	12740440	72.4	10.24
2009	0	1	-5538	338764	6	13122653	58.5	10.05
2010	0	1	-5438	325213	4	13516332	47.3	9.83
2011	0	1	-5338	312204	4	13921821	37.3	7.88
2012	0	1	-5238	299715	4	14339475	27.3	5.98
2013	0	1	-5138	290723	4	14769659	17.3	4.54
2014	0	1	-5038	282001	4	15212748	7.3	3.13
2015	0	1	-4938	273540	4	15669130	0	1.64
2016	0	1	-4838	268069	4	16139203	0	0.31
2017	0	1	-4738	262707	4	16623379	0	-1.04
2018	0	1	-4638	257452	4	17122080	0	-2.38
2019	0	1	-4538	252302	4	17635742	0	-3.74

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance (millions of pesos 1994). TAF99: Total armed forces (Police+Army)
 U9: Unemployment rate, Students9: Students enrolled in all modalities
 Despla99 : Displaced people (thousands).
 CVPC1B: Cyclical terrorist murder index

Table 5A

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	1,040	386,897	22	11,659,309	137.3	16
2006	0	1	100	363,683	20	12,009,088	110.9	16
2007	0	1	200	341,862	18	12,369,360	89.6	14
2008	0	1	300	321,350	16	12,740,440	72.4	12
2009	0	1	400	305,282	14	13,122,653	58.5	11
2010	0	1	500	290,018	12	13,516,332	47.3	10
2011	0	1	600	275,517	10	13,921,821	37.3	9
2012	0	1	700	261,739	8	14,339,475	27.3	8
2013	0	1	800	251,269	6	14,769,659	17.3	8
2014	0	1	900	241,218	5	15,212,748	7.3	7
2015	0	1	1,000	231,569	5	15,669,130	0	4
2016	0	1	1,100	231,569	5	16,139,203	0	4
2017	0	1	1,200	231,569	5	16,623,379	0	3
2018	0	1	1,300	231,569	5	17,122,080	0	2
2019	0	1	1,400	231,569	5	17,635,742	0	1

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance (millions of pesos 1994). TAF99: Total armed forces (Police+Army)
 U9: Unemployment rate, Students9: Students enrolled in all modalities
 Despla99 : Displaced people (thousands).
 CVPC1B: Cyclical terrorist murder index

Table 6A

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	372611	12	11659309	229.3	-16.80
2006	0	1	-6238	391004	12	12009088	208.2	-18.77
2007	0	1	-54.00	414464	10	12369360	89.6	24.06
2008	0	1	-64.00	439332	8	12740440	72.4	29.28
2009	0	1	-70.00	461298	6	13122653	58.5	33.97
2010	0	1	-59.00	484363	4	13516332	47.3	38.72
2011	0	1	-38.00	508581	4	13921821	37.3	41.84
2012	0	1	100.00	534010	4	14339475	27.3	45.26
2013	0	1	150.00	555371	4	14769659	17.3	47.98
2014	0	1	200.00	577586	4	15212748	7.3	50.80
2015	0	1	250.00	600689	4	15669130	0	53.64
2016	0	1	300.00	600689	4	16139203	0	53.00
2017	0	1	350.00	600689	4	16623379	0	52.34
2018	0	1	400.00	600689	4	17122080	0	51.66
2019	0	1	450.00	600689	4	17635742	0	50.95

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance (millions of pesos 1994). TAF99: Total armed forces (Police+Army)
 U9: Unemployment rate, Students9: Students enrolled in all modalities
 Despla99 : Displaced people (thousands).
 CVPC1B: Cyclical terrorist murder index

Table 7A

year	B	CL1	RTb9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	372611	12	11659309	229.3	-16.80
2006	0	1	-6238	391004	12	12009088	208.2	-18.77
2007	0	1	-54	371453	10	12369360	89.6	18.09
2008	0	1	-64	356594	8	12740440	72.4	17.78
2009	0	1	-70	345896	6	13122653	58.5	17.93
2010	0	1	-59	338978	4	13516332	47.3	18.52
2011	0	1	-38	335588	4	13921821	37.3	17.80
2012	0	1	100	328876	4	14339475	27.3	16.76
2013	0	1	150	322298	4	14769659	17.3	15.60
2014	0	1	200	306183	4	15212748	7.3	13.09
2015	0	1	250	287812	4	15669130	0	10.16
2016	0	1	300	259030	4	16139203	0	5.53
2017	0	1	350	235717	4	16623379	0	1.63
2018	0	1	400	235717	4	17122080	0	0.95
2019	0	1	450	235717	4	17635742	0	0.24

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands).

CVPC1B: Cyclical terrorist murder index

Table 8A

year	B	CL1	RTb9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	372611	12	11659309	229.3	-16.80
2006	0	1	-6238	391004	12	12009088	208.2	-18.77
2007	0	1	-54	312803	10	12369360	89.6	9.94
2008	0	1	-64	287778	8	12740440	72.4	8.22
2009	0	1	-70	287778	6	13122653	58.5	9.86
2010	0	1	-59	287778	4	13516332	47.3	11.41
2011	0	1	-38	287778	4	13921821	37.3	11.16
2012	0	1	100	230224	4	14339475	27.3	3.05
2013	0	1	150	218712	4	14769659	17.3	1.20
2014	0	1	200	218712	4	15212748	7.3	0.94
2015	0	1	250	214337	4	15669130	0	-0.04
2016	0	1	300	214337	4	16139203	0	-0.68
2017	0	1	350	214337	4	16623379	0	-1.34
2018	0	1	400	214337	4	17122080	0	-2.02
2019	0	1	450	214337	4	17635742	0	-2.73

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance

(millions of pesos 1994). Taf99: Total armed forces (Police+Army)

U9: Unemployment rate, Students9: Students enrolled in all modalities

Despla99 : Displaced people (thousands).

CVPC1B: Cyclical terrorist murder index

Table 9A

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	372611	12	11886802	229.3	-16.7966
2006	0	1	-6238	391004	12	12362274	208.2	-18.7716
2007	0	1	-54	312803	10	12856764	89.6	9.21224
2008	0	1	-64	287778	8	13371034	72.4	7.2793
2009	0	1	-70	287778	6	13905875	58.5	8.68785
2010	0	1	-59	287778	4	14462110	47.3	9.99595
2011	0	1	-38	287778	4	15040594	37.3	9.49211
2012	0	1	100	230224	4	15642217	27.3	1.10445
2013	0	1	150	218712	4	16267905	17.3	-1.03281
2014	0	1	200	218712	4	16918621	7.3	-1.6079
2015	0	1	250	214337	4	17595365	0	-2.91966
2016	0	1	300	214337	4	18299179	0	-3.90712
2017	0	1	350	214337	4	19031146	0	-4.93659
2018	0	1	400	214337	4	19792391	0	-6.00976
2019	0	1	450	214337	4	20584082	0	-7.12837

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance (millions of pesos 1994). TAF99: Total armed forces (Police+Army)
 U9: Unemployment rate, Students9: Students enrolled in all modalities
 Despla99 : Displaced people (thousands).
 CVPC1B: Cyclical terrorist murder index

Table 10A

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	372611	12	11886802	229.3	-16.7966
2006	0	1	-6238	391004	12	12362274	208.2	-18.7716
2007	0	1	-54	351903	10	12856764	89.6	14.6449
2008	0	1	-64	323750	8	13371034	72.4	12.2774
2009	0	1	-70	301410	6	13905875	58.5	10.5819
2010	0	1	-59	295381	4	14462110	47.3	11.0523
2011	0	1	-38	295381	4	15040594	37.3	10.5485
2012	0	1	100	295381	4	15642217	27.3	10.1576
2013	0	1	150	295381	4	16267905	17.3	9.61986
2014	0	1	200	295381	4	16918621	7.3	9.04476
2015	0	1	250	295381	4	17595365	0	8.34088
2016	0	1	300	295381	4	18299179	0	7.35343
2017	0	1	350	295381	4	19031146	0	6.32396
2018	0	1	400	295381	4	19792391	0	5.25079
2019	0	1	450	295381	4	20584082	0	4.13217

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance (millions of pesos 1994). TAF99: Total armed forces (Police+Army)
 U9: Unemployment rate, Students9: Students enrolled in all modalities
 Despla99 : Displaced people (thousands).
 CVPC1B: Cyclical terrorist murder index

Table 11A

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	372611	11.8	11659309	229.3	-16.80
2006	0	1	-6238	391004	12.35	12009088	208.2	-18.77
2007	0	1	-54	234602	10.35	12369360	89.6	-0.93
2008	0	1	-64	187681	8.35	12740440	72.4	-5.69
2009	0	1	-70	178296	6.35	13122653	58.5	-5.35
2010	0	1	-59	174730	4.35	13516332	47.3	-4.30
2011	0	1	-38	172982	4.35	14192148	37.3	-5.19
2012	0	1	100	172982	4.35	14901755	27.3	-5.74
2013	0	1	150	172982	4.35	15646842	17.3	-6.46
2014	0	1	200	172982	4.35	16429184	7.3	-7.23
2015	0	1	250	172982	4.35	17250643	0	-8.15
2016	0	1	300	172982	4.35	18113175	0	-9.38
2017	0	1	350	172982	4.35	19018833	0	-10.66
2018	0	1	400	172982	4.35	19969774	0	-12.02
2019	0	1	450	172982	4.35	20968262	0	-13.45

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance (millions of pesos 1994). TAF99: Total armed forces (Police+Army)
 U9: Unemployment rate, Students9: Students enrolled in all modalities
 Despla99 : Displaced people (thousands).
 CVPC1B: Cyclical terrorist murder index

Table 12A

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	372611	11.8	11659309	229.3	-16.80
2006	0	1	-6238	391004	12.35	12009088	208.2	-18.77
2007	0	1	-54	312803	10.35	12369360	89.6	9.94
2008	0	1	-64	281522	8.35	12740440	72.4	7.35
2009	0	1	-70	267445	6.35	13122653	58.5	7.03
2010	0	1	-59	267445	4.35	13516332	47.3	8.58
2011	0	1	-38	267445	4.35	14192148	37.3	7.93
2012	0	1	100	267445	4.35	14901755	27.3	7.38
2013	0	1	150	267445	4.35	15646842	17.3	6.67
2014	0	1	200	267445	4.35	16429184	7.3	5.89
2015	0	1	250	267445	4.35	17250643	0	4.97
2016	0	1	300	267445	4.35	18113175	0	3.75
2017	0	1	350	267445	4.35	19018833	0	2.46
2018	0	1	400	267445	4.35	19969774	0	1.10
2019	0	1	450	267445	4.35	20968262	0	-0.32

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance (millions of pesos 1994). TAF99: Total armed forces (Police+Army)
 U9: Unemployment rate, Students9: Students enrolled in all modalities
 Despla99 : Displaced people (thousands).
 CVPC1B: Cyclical terrorist murder index

Table 13A

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	372611	11.8	11659309	229.3	-16.80
2006	0	1	-6238	391004	12.35	12009088	208.2	-18.77
2007	0	1	-54	293253	10.35	12369360	89.6	7.22
2008	0	1	-64	249265	8.35	12740440	72.4	2.87
2009	0	1	-70	224338	6.35	13122653	58.5	1.04
2010	0	1	-59	206390	4.35	13516332	47.3	0.10
2011	0	1	-38	198134	4.35	14192148	37.3	-1.70
2012	0	1	100	198134	4.35	14901755	27.3	-2.25
2013	0	1	150	198134	4.35	15646842	17.3	-2.97
2014	0	1	200	198134	4.35	16429184	7.3	-3.74
2015	0	1	250	198134	4.35	17250643	0	-4.66
2016	0	1	300	198134	4.35	18113175	0	-5.88
2017	0	1	350	198134	4.35	19018833	0	-7.17
2018	0	1	400	198134	4.35	19969774	0	-8.53
2019	0	1	450	198134	4.35	20968262	0	-9.95

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance (millions of pesos 1994). Taf99: Total armed forces (Police+Army)
 U9: Unemployment rate, Students9: Students enrolled in all modalities
 Despla99 : Displaced people (thousands).
 CVPC1B: Cyclical terrorist murder index

Table 14A

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	372611	11.8	11659309	229.3	-16.80
2006	0	1	-6238	391004	12.35	12009088	208.2	-18.77
2007	0	1	-54	312803	10.35	12369360	89.6	9.94
2008	0	1	-64	281522	8.35	12740440	72.4	7.35
2009	0	1	-70	256184	6.35	13122653	58.5	5.47
2010	0	1	-59	245936	4.35	13516332	47.3	5.59
2011	0	1	-38	243476	4.35	14192148	37.3	4.60
2012	0	1	100	243476	4.35	14901755	27.3	4.05
2013	0	1	150	243476	4.35	15646842	17.3	3.33
2014	0	1	200	243476	4.35	16429184	7.3	2.56
2015	0	1	250	243476	4.35	17250643	0	1.64
2016	0	1	300	243476	4.35	18113175	0	0.42
2017	0	1	350	243476	4.35	19018833	0	-0.87
2018	0	1	400	243476	4.35	19969774	0	-2.23
2019	0	1	450	243476	4.35	20968262	0	-3.65

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance (millions of pesos 1994). Taf99: Total armed forces (Police+Army)
 U9: Unemployment rate, Students9: Students enrolled in all modalities
 Despla99 : Displaced people (thousands).
 CVPC1B: Cyclical terrorist murder index

Table 15A

year	B	CL1	RTb9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	372611	11.8	11659309	229.3	-16.80
2006	0	1	-6238	391004	12.35	12009088	208.2	-18.77
2007	0	1	-54	312803	10.35	12369360	187.38	6.68
2008	0	1	-64	281522	8.35	12740440	176.13	3.90
2009	0	1	-70	256184	6.35	13122653	169.08	1.78
2010	0	1	-59	245936	4.35	13516332	164	1.71
2011	0	1	-38	243476	4.35	14192148	147.6	0.93
2012	0	1	100	243476	4.35	14901755	125.46	0.78
2013	0	1	150	243476	4.35	15646842	112.91	0.15
2014	0	1	200	243476	4.35	16429184	101.6	-0.58
2015	0	1	250	243476	4.35	17250643	91.43	-1.40
2016	0	1	300	243476	4.35	18113175	82.28	-2.32
2017	0	1	350	243476	4.35	19018833	74.05	-3.34
2018	0	1	400	243476	4.35	19969774	37	-3.46
2019	0	1	450	243476	4.35	20968262	0	-3.65

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance (millions of pesos 1994). Taf99: Total armed forces (Police+Army)
 U9: Unemployment rate, Students9: Students enrolled in all modalities
 Despla99 : Displaced people (thousands).
 CVPC1B: Cyclical terrorist murder index

Table 16A

year	B	CL1	RTb9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	372611	11.8	10340509	229.3	-16.80
2006	0	1	-6238	391004	12.35	10030294	208.2	-18.77
2007	0	1	-6288	312803	13.35	9729386	187.38	4.06
2008	0	1	-6338	281522	14.35	9437504	176.13	-1.36
2009	0	1	-6388	256184	15.35	9154378	169.08	-6.10
2010	0	1	-6438	245936	16.35	8879746	164	-8.80
2011	0	1	-6488	243476	17.35	8613353	147.6	-10.46
2012	0	1	-6538	243476	18.35	8354952	125.46	-11.48
2013	0	1	-6588	243476	19.35	8104303	112.91	-12.99
2014	0	1	-6638	243476	20.35	7861117	101.6	-14.59
2015	0	1	-6688	243476	21.35	7625281	91.43	-16.29
2016	0	1	-6738	243476	22.35	7396522	82.28	-18.08
2017	0	1	-6788	243476	23.35	7174626	74.05	-19.97
2018	0	1	-6838	243476	24.35	6959387	37	-20.97
2019	0	1	-6888	243476	25.35	6750605	0	-22.04

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance (millions of pesos 1994). Taf99: Total armed forces (Police+Army)
 U9: Unemployment rate, Students9: Students enrolled in all modalities
 Despla99 : Displaced people (thousands).
 CVPC1B: Cyclical terrorist murder index

Table 17A

year	B	CL1	RTB9	TAF99	U9	STUDENTS9	DESPLA99	CVPC1B
2005	0	1	-3308	372611	12	10340509	229	-16.80
2006	0	1	-6238	391004	12	10030294	208	-18.77
2007	0	1	-6288	406644	13	9729386	219	15.08
2008	0	1	-6338	422909	14	9437504	230	16.47
2009	0	1	-6388	439826	15	9154378	241	17.93
2010	0	1	-6438	457419	16	8879746	253	19.44
2011	0	1	-6488	475716	17	8613353	266	21.02
2012	0	1	-6538	494744	18	8354952	279	22.67
2013	0	1	-6588	514534	19	8104303	293	24.39
2014	0	1	-6638	535115	20	7861117	308	26.18
2015	0	1	-6688	556520	21	7625281	323	28.06
2016	0	1	-6738	578781	22	7396522	339	30.02
2017	0	1	-6788	601932	23	7174626	356	32.06
2018	0	1	-6838	626009	24	6959387	374	34.20
2019	0	1	-6888	651050	25	6750605	393	36.43

B: Bogotazo years, CL1: Alternation in power, Rtb9: Real trade balance (millions of pesos 1994). Taf99: Total armed forces (Police+Army)
 U9: Unemployment rate, Students9: Students enrolled in all modalities
 Despla99 : Displaced people (thousands).
 CVPC1B: Cyclical terrorist murder index

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